THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. FEBRUARY 28, 1895. CHICAGO, ILL. NUMBER 9.

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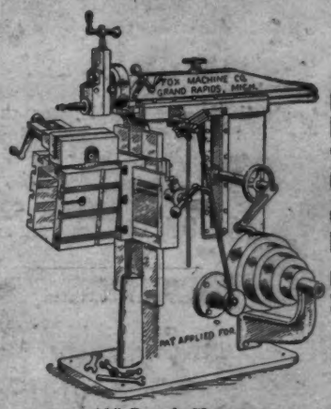

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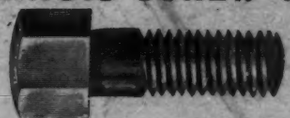

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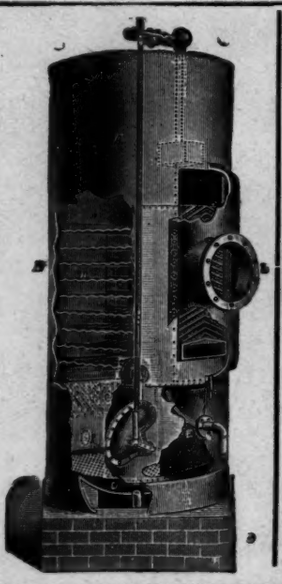

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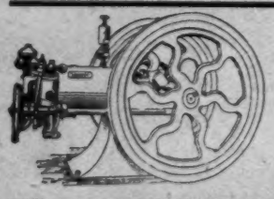

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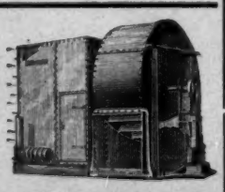

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. FEBRUARY 28, 1895. CHICAGO, ILL. NUMBER 9.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The buying of Bessemer pig iron by the leading Pittsburg interest as noted last week, has continued, and the advance of this metal to $10.25 Pittsburg, is the most significant development of the week. It is estimated that from 70,000 to 80,000 tons of Bessemer iron have been taken in these purchases, sufficient to give decided strength to that market. Comment on these transactions among the interests affected, runs to their bearing upon the future prices of Lake Superior ores and Connellsville coke. They are interpreted as a confirmation of the view that has been taken for some time, that coke contracts after April 1, and ore contracts after May 1 will be on a higher basis, and therefore that as far as Bessemer pig is concerned the lowest price has been touched, the same statement applying also to Bessemer steel products generally. The situation today as to Bessemer pig is firmer than at any time since November and on small-lot transactions in the past two days it is reported that from 5 to 10 cents advance upon $10.25, Pittsburg, has been paid. While the iron ore situation has not worked out to the point of actual contracts for 1895, the developments in Bessemer pig are regarded in some quarters as rather preparatory to the basis which the Bessemer ore producers' agreement has aimed at; what is needed to give the nominal advance in prices practical effect is an initial purchase of round proportions. The advance in Bessemer pig has not been attended as yet by any improvement in foundry or forge iron. On Southern iron, prices lately made in the Chicago district confirm the reports of cutting that have been current there; open quotations are now 10 to 15 cents below those of a few weeks previous. Some sellers of Southern iron report a better outlook for good-sized purchases in portions of their territory. The period of uncertainty as to the course of the market for foundry and mill irons in the spring months seems to have about run its course, and later developments strengthen the belief that the present time offers advantages to the buyer that will not be duplicated when consumption by mills and foundries broadens, as is counted on, in the second quarter of the year. Pipe contracts are being let by a number of Eastern cities, and New Jersey foundries have closed a considerable tonnage. Southern pipe works are figuring on other business soon to be let in the East. About 80,000 tons is involved in contracts recently made and those pending. Car works are busier. The 3,000 cars of the New York Central, 1,000 of the Pennsylvania and 2,000 of a Western line, besides smaller orders, give a much improved outlook, and some bar iron contracts have been made in consequence. Eastern advices note an order for 1,600 tons of structural material taken by the Pencoyd Iron Co. Western Bessemer pig which was weak at $12, Philadelphia, is firmer at that figure.

THE CLEVELAND OUTLOOK.

The echoes of the Milwaukee publication of last week relative to Lake Superior properties on the old ranges are still heard, but the disturbance was comparatively slight in those branches of the iron trade conversant with the developments of the past two years. Buyers in lines more remote from the raw material may have to learn through market transactions from week to week that a fresh avalanche of low values has not swept down upon the iron business. The developments of the week in Bessemer pig have been a signal to some in the trade that the reaction has begun and that the way is opening for the new basis of Bessemer ore prices. Small ore sales in the past few weeks have been on the level of the best prices realized last season. In the East no foreign ore is coming in, barring manganese and manganiferous iron ore.

Pig Iron. The buying of Bessemer pig on Pittsburg account, as noted last week, has kept up, and estimates on the total range from 80,000 to 100,000 tons. The chief Pittsburg interest bought most of the metal. The transactions of the past week were most of them at $10.20, Pittsburg, though $9.60 in the valley was the price on one lot, with deliveries running into May, and a transaction following the heavy buying is reported at $10.30, Pittsburg. The fact that all the purchases of the past two weeks have been for legitimate consumption, with no speculative element at work, gives significance to them. There is naturally a general discussion of them in their possible bearing on a coke strike. The fact that some of the deliveries extend into May is cited in contradiction of deliberate preparation for a coke strike, but since it is well known that considerable stocks are now in furnace yards and that there will be good-sized piles on April 1, it might be possible for the buyer to call for much of his iron, even in the event of a strike. The strong argument against a strike, however, lies in the disposition of both worker and operator to avoid it, and it is believed a small advance is more likely than a general strike. An inquiry for 5,000 tons of Bessemer for shipment to the Cleveland district has come up in the wake of the larger buying.

Finished Material. The placing of car orders has led to some bar iron contracts which the valley mills have taken. The Detroit car works, usually buyers of bars, will be able to supply all their requirements at a connected mill. Valley prices have gained no strength, capacity being so far beyond demand. An inquiry for plates for a Northern Ohio agricultural works is the only business of moment in that part of the market. Beams and channels for early shipment are in light demand, at unchanged prices. A better promise for finished steel is reflected in the declining of a $15.50 offer for billets in the Cleveland market.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The market has been very quiet in all its branches during the past week. Sales of nearly all classes of material have been fairly good, keeping up the pace of several weeks preceding, but not increasing in volume. While there are no features of the situation that would induce hope for much better things in the near future, it is a fact that there is a cheerful tone among dealers—much more cheerful than for some time. It is possible that the springlike weather of the week is in part accountable for it.

PIG IRON.—As has been the case for some time past, deliveries are being called for rapidly by the foundries, and sales enough to keep the furnaces busy from week to week continue to be made. In the past week, the largest sale was of 1,500 tons of local iron, at ruling quotations. Aside from this, sales of lots of carloads to 100 and 200 tons were quite frequent. A report is current that one of the local producers is a little weak on prices, but it seems to have slight foundation. No definite charges of cutting were made. The Southern producers are not getting quite as much business as at the opening of the month, and the result is seen in the weakness of prices made by some furnaces. Open quotations are now made as per our prices, which follow. Only a few small sales of Southern iron were made last week. Lake Superior charcoal iron is in only light demand, and very few and small sales are being made. Quite low quotations are being made on some of the bankrupt stocks which are not disposed of, but standard quotations are unchanged. Our quotations follow:

Lake Sup. Charcoal	$13 00@13 50	Southern No. 2 Soft	$ 9 75@10 00
Local Coke Fdy. No. 1	10 25@10 50	South'n Silveries No. 1	11 50@11 75
Local Coke Fdy. No. 2	9 75@10 00	South'n Silveries No. 2	11 25@11 50
Local Coke Fdy. No. 3	9 40@ 9 65	Jackson Co. Silveries	15 50@16 00
Local Scotch Fdy. No. 1	10 25@10 50	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 2	9 75@10 00	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 3	9 50@ 9 75	Ohio Strong Softeners	12 50@13 00
South'n Coke No. 2	10 00@10 25	Alabama Car Wheel	17 50@18 00
South'n Coke No. 3	9 50@ 9 75	Malleable Bessemer	11 00@11 50
Southern No. 1 Soft	10 00@10 25	Coke Bessemer	11 00@11 50

BARS.—The largest order of the week is one of 500 tons taken from a car builder by an Ohio mill, at quoted prices. The bar trade seems to be strengthened a little by the announcements of the placing of orders for 3,000 cars by the New York Central, and of 1,000 cars by another road, coupled with the fact that the M., K. & T is in the market for 2,000 cars, which will be placed in the near future. The better feeling has not been reflected thus far by the quotations of local sellers. General trade is quiet, and prices continue to be made at 1c for common iron; guaranteed iron, 1.15c; steel bars from strictly billet stock, 1.20c.

RAILS AND TRACK SUPPLIES.—The situation is unchanged, and only small orders were booked in this market last week. Prices are unchanged, as follows: Rails, $23 to $25; splice bars, 1.25c to 1.30c; track bolts, 1.95c to 2c; spikes, 1.65c. to 1.70c.

BILLETS AND RODS.—Only a few small sales of either billets or rods are reported, and there is no change in quotations. Billets, $16.50 to $17; rods, $23 to $23.50. No conclusion has been reached yet as to when the Joliet mill will be started up.

STRUCTURAL MATERIAL.—Several orders have been taken in the week for bridge material, one of them of quite good size. General business is a little better with the letting up of the extremely cold weather, and it is expected to be good from this on. Prices are made as follows: Beams and channels, 1.45c to 1.50c; angles, 1.30c to 1.35c; plates, 1.40c to 1.45c; tees, 1.55c to 1.60c. Small lots from stock are quoted at from ¼c to ½c higher.

PLATES.—Inquiry is only light, and no sales of any consequence are reported. Quotations are as follows: Tank steel, 1.35c to 1.40c; flange steel, 1.50c to 1.75c; firebox steel, 2c to 5c; boiler tubes, 75 to 77½ per cent discount.

MERCHANT STEEL.—There continues to be a good demand from some classes of trade, but general business is still quiet. Prices are now made as follows: Open-hearth spring, tire and machinery steel, 1.55c to 1.60c; smooth finished tire and machinery, 1.50c to 1.60c; Bessemer bars, 1.35c to 1.40c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SHEETS.—The disposition on the part of the jobbing trade to ascertain the feeling of the mills as regards prices for future deliveries is still noticed, but so far no large sales have been made. In fact, most of the mills are not disposed to name prices for long deliveries. General business is quiet, and only small sales were reported last week. Prices are made at 2.30c to 2.35c for No. 27 common iron; steel sheets are quoted at 2.40 to 2.45c; galvanized sheets, 75 and 10 per cent discount.

OLD RAILS AND WHEELS.—There was an attempt to buy 1,000 tons of old iron rails last week, from a dealer who is holding large stocks, but the offer made, $10.85, was refused. Buyers, however, consider any such price as this exorbitant, and refuse to offer more than $10.50, as a rule. It is probable that this latter figure is nearer the actual value of the material. Old steel rails are quiet at $6.50 to $7 for short, and $8.50 to $9 for long lengths. No sales are reported of wheels, which remain at $8.50.

SCRAP.—There was quite a movement in scrap last week, particularly in railroad forge, which has been strengthened in price as a consequence. Several large sales were made of this class of scrap. A sale is also reported of 3,000 tons of heavy melting steel scrap. Quotations are quite firm, as follows: Railroad forge, $8.50 to $9; dealer's forge, $7; No. 1 mill, $6.50; No. 1 machinery, $7; axles, $12.25 to $12.50; cast borings, $3.50; wrought turnings, $5.25; axle turnings, $6.25; mixed steel, $5; heavy cast, $7 to $7.25; stove plates, $5 to $5.50; heavy melting steel, $7 to $7.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg.

The Bessemer pig and billet markets scarcely maintain the $5 interval of prices. While buying of the last ten days by the leading steel producer, with smaller buying by another steel company, has tended to strengthen the position of the furnacemen, the shutting down of the Edgar Thompson steel mill is cited, on the other hand, as an indication that it is not the demand for billets and rails that has led to the buying of Bessemer pig. The fact that some Valley furnace managers were reported to be seriously considering the advisability of going out of blast may have had something to do with the purchases, the cutting off of coke orders that would result from such a course being a possible factor. Another element mentioned is the advance in the price of Bessemer which might result from such curtailment of production, the conclusion evidently being that the present would be a more favorable time to buy than 60 days hence. The probabilities of a coke strike are also being discussed in connection with these Bessemer purchases by the leading interest. It is the opinion of some authorities that no strike will be forced by the operators, and that a slight advance might be conceded to avoid a deadlock. The output of Connellsville ovens in the week ending February 16 is estimated at 152,010 tons, a gain

of over 15,000 tons. Shipments went up to 7,808 cars after being cut down to 6,916 by severe weather the week previous. There is no certainty about prices after April 1. Additional sales of Bessemer pig this week have brought the market up to $10.25. In foundry and forge iron, demand is weak and prices remain at $9.75 for No. 2 foundry and $9.10 for gray forge. Soft steel billets have shown no change. The market is fairly quoted at $15, with sellers holding their ground in view of the lessened production. Structural material is in fair demand for early delivery, though the bulk of the orders on the books of the mills are for spring and summer shipment. Beams and channels continue at 1.20c@1.25c. Wire mills are well employed. Wire nails are sold at 90c in lots of several cars; the tendency is to firmness. In old material there has been a somewhat better movement, with a firmer tendency.

Cincinnati. There is an improved demand for iron, and some large transactions are now pending. At the same time there is not the general improvement that the circumstances might seem to warrant. It would certainly seem as if any consumer who has a reasonable prospect for work ahead would be justified in buying for deliveries as far forward as possible on the present extreme low basis of prices, but the course of the market has been downward continuously for so many years that it will take the substantial evidence of an actually advancing market to persuade many that the bottom has been reached. We look for a steadily increased demand, and there is encouragment for the belief that it will reach a magnitude sufficient to take up the surplus of stocks and create a turn upward in the market. On the other side of the picture, however, are the weekly exhibits of decreased railroad earnings, the extreme slowness of all classes of railroad work to materialize into orders, the dullness of general jobbing foundries, agricultural works and some other specialties, and the knowledge that there can be no permanent settlement of the currency problem until a new Congress convenes. There is no change in values of either Northern or Southern irons, but minimum prices can no longer be shaded.

St. Louis. The market is holding up with the improvement which started in the early part of this month. The demand is not confined to one class of irons, showing that there is a reaction in trade in general. Prices on Southern irons are firm at quotations ruling the past two weeks.

Buffalo. A fair run of business is in progress, showing a slight improvement over recent conditions, but still below a stage satisfactory to either producers or consumers. Prices remain stationary with a firmer tone and an apparent absence of any disposition on the part of sellers to make concessions from present medium prices. Makers appear to have touched a well-defined bottom and have decided that they are better off without business than to follow a downward tendency further. Lake Superior charcoal stocks at lower lake ports are nearly exhausted.

AT Pittsburg, Geo. S. Griscom, receiver of Moorhead-McCleane Co., in answer to the application of the New York Life Insurance Co. for foreclosure of $350,000 mortgage, says that to sell now would be to sacrifice the property, but he hopes with better times to realize enough to pay off the mortgages.

The Cleveland Steel Canal Boat Co., capital $175,000, which will build small barges to go through the Erie Canal has been incorporated at Columbus, O.

LAKE SUPERIOR IRON MINES.

The secretary, F. W. Denton, of Soudan, Minn., sends the following notice of the meeting of the Lake Superior Mining Institute, to be held next week: "The third annual meeting of the Institute will begin on Wednesday morning, March 6, at Duluth, Minn., and end at the same place on Friday evening, March 8. Shortly after the arrival at Duluth of the Duluth, South Shore & Atlantic train from the East, on Wednesday morning, a train will convey the members to some point on the Mesabi range, probably to Virginia. From Virginia the party will work east on Thursday, arriving in Tower on Thursday evening. On Friday, visits will be paid to the mines of the Virmilion range at Soudan and Ely, and the party will be returned to Duluth the same evening. A detailed program will be issued later. Both the Duluth & Iron Range and the Duluth, Mesabi & Northern Railways have promised special trains, so that there will be no delay in getting from place to place. Meetings for the reading and discussion of papers, and transaction of business, will be held in Virginia and Tower."

The Pittsburg & Lake Angeline Co. suspended work in A shaft at the old mine, Ishpeming, Mich., last week. It has been operating three shafts, A, C and D, at this mine, and about 400 men have been given employment there, while the balance, about 300 in all, have been employed at the new, or East End mine. About 80 men will be laid off by the closing down of A shaft. The management believe that the mine was producing more ore than sale can be found for the coming season. The ore at the old mine, and especially that from A shaft, is not of as high and uniform a grade as that of the new mine, and the stockpile room was almost entirely taken up.

The Oliver Mining Co., which holds a lease of the Mesabi Mountain mine at Virginia, has given to the Union Trust Co. of Pittsburg a trust deed to its lease and other holdings. This deed is for $125,000, and is intended to secure the trust company on the same amount of second mortgage six per cent gold bonds, payable in six, seven and eight years.

At the Chapin mine between 1,400 and 1,500 tons is the present daily output. Nearly 700 men are at work, and the stockpile contains 150,000 tons.

A new hoisting engine and drum are being put in at the Lillie mine.

At the Mountain Iron there has been an almost complete suspension of steam shovel work; about 225 men are employed, most of them clearing land.

At the Norrie mine the night force of 250 at Nos. 6 and 7 shafts was laid off last week. There had been from 900 to 1,000 at work in all parts of the property. Stock pile room was lacking and no ore had been sold.

At the Star West mine, on the Marquette, formerly known as the Wheat, 30,000 tons of ore have been put on stockpile and it is expected that 20,000 tons more will be mined before navigation opens. The ore is close to the Bessemer limit.

Capt. S. S. Curry, president of the Metropolitan Land & Iron Co., writes the Milwaukee paper in which first appeared the pretended interview with him which was telegraphed all over the country, that the article was an "exaggeration of falsehoods and the product of a diseased mind or a knave."

The report that the Duluth & Iron Range had advertised for bids for an extension from Virginia to Iron Mountain and Hibbing, is denied.

A growing disposition is reported, to resume exploratory work on the Menominee range.

At the Mahoning Ore Co.'s property near Hibbing, on the Mesabi, nearly one-fourth of the stripping contract has been completed, the surface being taken from an area 75x1,000 feet, to a depth of 18 feet.

SEVERAL parties of Johnson Co. employes have moved from Johnstown to Lorain in the past three weeks. The great engine built at Manchester, Eng., is expected to arrive in this country this week, and it is the plan to have it installed at the steel works by April 1. The removal of the rolling mills from Johnstown to Lorain required 600 cars.

THE stock of tin plate at Swansea, Feb. 9, was 234,842 boxes, against 250,875 boxes on the same date last year.

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FEBRUARY 28, 1895.

THE statement of Bessemer steel production in 1894 is interesting when put beside the returns for the decade ending with that year. In the same connection, we bring together the total steel rail and street rail production from Bessemer steel, in the years in question, and add a column showing the output of open-hearth steel, acid and basic:

PRODUCTION OF BESSEMER AND OPEN-HEARTH STEEL AND RAILS IN THE UNITED STATES—GROSS TONS.

Year.	Bessemer Ingots.	Steel Rails.	Street Rails.	Open-hearth Ingots.
1885	1,519,430	959,471	32,134	133,376
1886	2,269,192	1,574,703	42,865	218,973
1887	2,936,933	2,101,904	51,216	322,069
1888	2,511,161	1,386,277	44,951	314,318
1889	2,930,204	1,510,057	70,120	374,543
1890	3,688,871	1,867,837	98,529	513,232
1891	3,247,417	1,293,053	81,302	579,753
1892	4,168,435	1,537,588	111,580	669,889
1893	3,215,686	1,219,400	133,423	737,890
1894	3,579,101	1,014,034	155,196	.....

In 1881, 1882 and 1883, nearly 90 per cent, of the Bessemer steel ingots went into rails. The figures above show how other uses have gradually taken up the Bessemer output until last year the percentage used in rails was but 28.3, the smallest on record. Of the total of rails last year, about 200,000 tons went into new mileage and the balance, something over 800,000 tons, into renewals. The steady increase in the production of street rails is another feature of the table. The column of open-hearth production shows the continued development of that industry. Statistics are not available, to indicate how much is made by the basic and how much by the acid process, but it is known that the former is still a comparatively small factor.

IT illustrates again the disposition of the average newspaper reader to accept a printed story, because it is on a newspaper page, that there should have been so much disturbance over the dispatches from Milwaukee, detailing a pretended interview with President Curry, of the Metropolitan Land & Iron Co. That Mr. Curry should have made statements calculated to depreciate the value of every share of mining stock he held was inexplicable to his business associates, and they were not slow in pronouncing the interview spurious; but it seems strange that holders of Gogebic stocks in various parts of the country should have been led to telegraph to Cleveland to assure themselves that there really had been no cataclysm and that their holdings were just as valuable as in the week preceding. It is well known among those nearest him that, in spite of the influences that have been at work in the past two years, forcing down the price of ore, Mr. Curry has large faith in the future of the Gogebic range, and has favored the acquisition by his company of additional properties. It is the opinion of conservative men, and this view is shared by those best acquainted with the Mesabi, that the developments of the past year relative to the new range have not tended to add to the depreciation of old-range properties. It was the uncertainty about the Mesabi and the extravagant claims of early holders of its properties that did the most harm. Ignorance of the strength of a foe always excites fear and exaggerates his power for harm. And what has been experienced in battle is repeated in the sharp competitions of business. The more definite the information about the Mesabi, the more history it makes in actual mining operations, and in actual market transactions, the more confidence old range companies acquire, after the fearfulness and uncertainty and sharply accented depression of the past year. While there has been a depreciation in mining stocks, due to the unprecedentedly rapid fall in the price of ores, there has been nowhere, perhaps, such pronounced shrinkages in stock values as on the Mesabi itself. Some of the Gogebic records of eight years ago have really been lowered, in the rapidity with which some Mesabi operators have got in and out of the mining business. It is certain that the bottom has been reached, and the present, with its better outlook for Bessemer ore consumption, and, in consequence, of Bessemer ore prices, is least of all a time to indulge in such talk as has been so easily floated in the newspaper market by a Milwaukee sensationalist.

THE incorporation at Columbus, of the Cleveland Steel Canal Boat Co., by well-known gentlemen, some of them already connected with marine and shipping interests, marks the placing of the project for small steel barges to run from Cleveland to New York by Lake Erie and the Erie Canal, on a working basis. Nearly all the stock has been taken, and plans for the builders are completed. Most of the proposed fleet can be put in service before the close of the coming season of navigation, and its effect on the Eastern market for finished iron and steel from points in the Cleveland district will be a matter of demonstration before the year is out.

THE certainty that the railroad pooling bill will not get through the present Congress is an added element of weakness in the situation so far as it is affected by railroad buying.

THE sharpness of competition on all finished products has led to an effort by British iron masters to come together and stop ruinous cutting. A meeting of manufacturers of finished iron was held at Birmingham Feb. 7, and a plan was proposed for a combination that should include both manufacturers and representatives of the workmen's organizations. One scheme considered was the creation of a joint board and the enforcement of its decisions as to prices and wages by withdrawing operatives from mills selling under the established price. A pool on production was also talked of. Some 200 concerns in Staffordshire, Shropshire, Derbyshire, Lancashire, Yorkshire and Worcestershire are represented in the movement and it is stated that the objects sought and the methods proposed were approved by all but one prominent firm, which took the position that the only way to meet German and Belgian competition is by cheapening production.

A Sheffield cablegram of Feb. 27 says that the scheme has been perfected and is now being submitted to the manufacturers. It provides for the organization of the Midland Iron Trade Association, with a committee of 20 to manage its affairs, to fix prices, negotiate with the workmen's unions, impose fines for underselling, restrict production, and to perform the other functions of a combination's executives. Shorter hours of labor, the inclination of strong labor unions to be arbitrary, and the tendency toward higher fuel costs, are some of the handicaps upon British iron masters in their struggle against Continental competition. It will be interesting to note with what success the proposed organization, should it be perfected, will cope with these problems.

SOUTHERN FOUNDRY IRON, AGAIN.

C. A. Meissner, general manager of a Birmingham furnace company, and familiar with Northern as well as Southern furnace practice through his connection with an Ohio furnace some years ago, writes of "Northern vs. Southern Iron" in the last issue of the Chattanooga *Tradesman*. The basis of the article is one of the same caption that appeared in *The Iron Trade Review* of Jan. 3, giving the results of this paper's inquiries among foundrymen in the Chicago district as to the displacement of Southern by Northern iron the past year. Mr. Meissner refers to our article as "a very careful and instructive collaboration of facts on the subject at issue and deserving of praise for the spirit shown and the manner in which the information sought was collected." In tracing the causes of the increased sale of local irons to foundrymen in and about Chicago in 1894, Mr. Meissner mentions the light demand for steel rails and the diversion of much of the blast furnace capacity of the Illinois Steel Co. from Bessemer to foundry iron, and the fact that ores were delivered at Chicago at a price unprecedentedly low. He predicts that when the steel rail trade becomes active again, and the furnace capacity of the Chicago district is more fully occupied on Bessemer pig, there will be less competition on foundry iron and Southern furnaces will regain their lost ground.

In discussing the question of quality, Mr. Meessner admits that there was in many cases ground for the old prejudice existing against Southern irons; but he asserts that to-day with laboratories established at Southern furnaces, and raw materials subjected to frequent analyses, Southern iron has attained a uniformity and regularity not formerly known. He confirms what has been said in these columns, in discussing this question, that as a rule the majority of Southern irons are high in silicon and should be used as softeners and not for material requiring very much strength. Yet there are Southern brands fully as strong as any in the North. On the other hand, he recognizes the fact that there are Northern brands that answer as softeners as well as those of the South. He adds, speaking of general conditions, that the "tendency will always remain for Northern iron to be stronger, harder, of greater shrinkage, and Southern irons softer, though weaker, more fluid and with less shrinkage." In conclusion, after reviewing some of the expressions contained in replies to *The Iron Trade Review's* inquiries, Mr. Meissner says:

What interests Southern producers as much as anything else is the favor which Southern iron meets with in the machinery trade; replies from heavy and light machinery makers indicate large uses of Southern iron, whereas the general opinion had been that for this class of material it was not fitted at all. Yet it is a well known fact that soft, phosphorous iron can be, and is made in the South that would answer well for this purpose, and on close analysis by the furnaces, no difficulty would be experienced in furnishing the machinery man with this grade of pig and holding his trade.

The conclusions to be drawn from this are plain. Aside from prices, Southern makers to compete successfully with Northern iron in Chicago must follow more closely the methods of their Northern competitors. The scientific departments in the North largely control the make, and often the plant; in the South they still hold their subordinate positions, frequently handicapped in their efforts to systematize and control the make of the iron, yet the march of progress is slowly, steadily onward by the irresistible impulse of that merit which pushes itself forward in spite of all opposition, and which is an absolute necessity when it comes to getting a permanent hold on such a closely contested, progressive and intelligent market as that represented in Chicago.

Leaving out special adaptations to special uses, and conceding that softeners and strong irons can be secured in both sections, though more of the former comes from the South and much more of the latter from the North, the question comes down, as we have said before, to one of price. That, under the conditions ruling to-day, is the paramount consideration.

THE expiration of the basic steel patents may result in a larger output of steel by the Thomas Gilchrist process; but so far as the United States is concerned the termination of royalty payments is of little significance, this process not having been worked until recently and then on a limited scale. The London *Iron and Coal Trades Review* says:

In Germany and in Austria-Hungary the patents do not expire until April. While the patents have been in existence, two of the leading German works—the Hoerder and the Rhenische Steelworks—have drawn considerable revenues from them, in pursuance of the arrangements made with the syndicate, by whom the patents are controlled. The syndicate consists of the sister of the late Sidney G. Thomas, Mr. Percy C. Gilchrist, Mr. G. J. Snelus, Mr. Ed. Riley, Mr. E. P. Martin, and Messrs. Bolckow, Vaughan & Co. From first to last the English patents have yielded over £100,000. The American patents, however, have resulted in a very limited profit.

Natural Gas for Gray Iron Castings.

Successful experiments have been conducted recently at the Whitely Malleable Casting Works at Muncie, Ind., in the melting of iron for gray castings by the use of natural gas exclusively. The special appliances contrived by Mr. Bert Whitely have been successfully used in the malleable work of the concern, but in gray iron work the ordinary cupola, with coke fuel, has been employed. For the tests made last week, which we are informed were entirely satisfactory, a special furnace was used, five feet high and 15 feet in length, with a capacity of seven tons of iron. The gas was turned in from either side under an eight-ounce pressure, while formerly a very heavy pressure was put on. In one end, an extra furnace is built containing coiled pipes, through which air is forced, being brought to a high temperature before it is introduced into the melting furnace. The blast can be held for a considerable time after the iron is ready for the pouring. In the tests reported to us, the blast was held a half hour after the heat was ready to be taken off. Test bars, one inch square and 30 inches long, were cast from the first and from the last ladle of iron. These showed a strength of 1,475 pounds. The mixture was No. 2 iron and 25 per cent of scrap. It is claimed that a higher percentage of scrap can be used than in ordinary cupola work. The castings made in the public test of last week at the Whitely works were highly satisfactory, being examined by foundrymen from other Muncie establishments. Messrs. Bert and Elmer Whitely have covered their process with patents. They have contracted to put in a furnace for a Canadian firm, and promise to make malleable and gray iron castings in alternate heats from the same furnace.

W. D. REES, of Cleveland, president of the Republic Iron Co., is spending the later winter months in Florida.

THE BROSNAN MOLDING MACHINE.

In the Brosnan molding machine, designed by M. J. Brosnan, 518 Henry st., Brooklyn, N. Y., a cam motion is employed for drawing the pattern. A simple operation by hand or power communicates a partial revolution which raises the pattern, and after the sand is applied and compressed, a proper motion of the cam shaft in the opposite direction draws the pattern down from the stripping plate. A positive stop arrests the revolution at the right point when the pattern is up. The arrangement holds the pattern plate alternately at the respective ends of its motion first with the pattern up and then with it down without requiring any fastenings.

The frame A is provided with vertical ways or guides A′, which receive long, straight parallel arms, B′, rigidly bolted to and extending down from a rising and sinking table or pattern plate, B, on which the pattern M is secured. A small pinion, C, is mounted on a fixed stud, A^2, supported on the framing A, and by means of a light fly wheel, C′, and a crank handle, C^2, is turned at will in either direction. The cam shaft D carries the eccentric cams D′ D′ of equal size and similarly set on the shaft. A large gear, D^2, on one end of this shaft is engaged by the pinion C. In the adjustable and exchangeable stripping plate E engage T-headed screws, E′, which extend downward through holes in the frame. They are stiffly set by means of the nuts E^2, E^3, E^4.

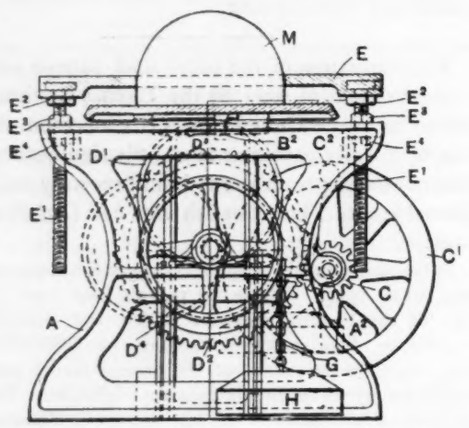


FIG. 1.—SECTIONAL END ELEVATION.

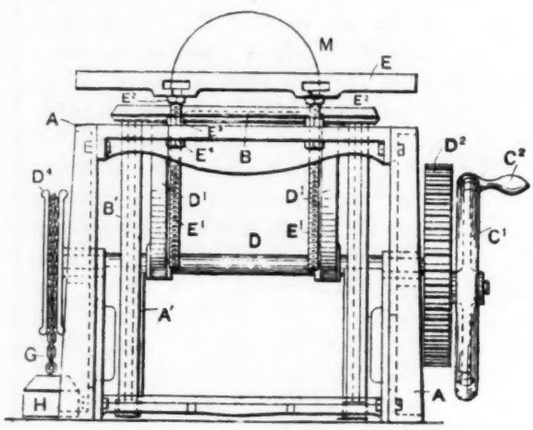


FIG. 2.—SIDE ELEVATION.

The under face of the pattern plate, B, presents nicely finished surfaces adapted to receive the action of the eccentric cams D′. By giving the crank C^2 a few strong turns in one direction, the cam shaft is partially revolved, and the pattern plate B is raised to the required position, protruding the pattern M to the required extent through the carefully executed aperture in the stripping plate, and by means of the long, straight guide arms B′ held firmly against tilting. The flask, not shown, is applied and the sand introduced, rammed and struck, by hand or by machinery, in any ordinary or suitable manner. Now the operator turns the crank C^2 a few revolutions in the opposite direction, with the effect to lower the pattern plate and its attachments, including the pattern M. The eccentric form of the cam and the fact that the crank C^2 is started from a state of rest insure that the descending motion of the pattern shall be slow at the commencement. The guides or vertical ways A′ steady the movement, so that there is no trembling or irregularity laterally, and the pattern is drawn smoothly out of the sand, the first part of the motion being slow and the later portion of the descending movement rapid. A projection, D^3, is cast in the required position on one side of each cam.

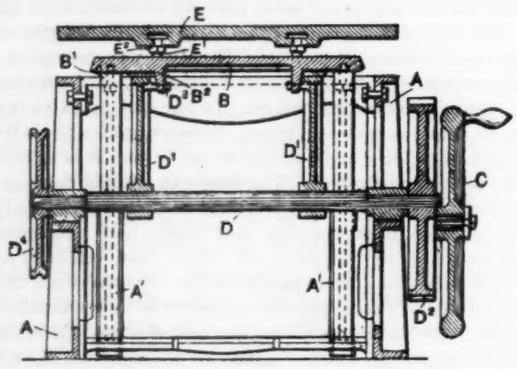


FIG. 3.—MACHINE WITH PATTERNS REMOVED.

The stops B^2 are fixed in the required positions on the under face of the pattern plate B. When the cam shaft has been sufficiently rotated to bring the cams into their highest position the projections D^3 strike the stops B^2 and insure that the motion is arrested at that point.

A grooved pulley, D^4, is keyed on the end of the shaft D, and carries a chain, G, by which a sufficiently heavy weight, H, is suspended. The force thus received tends to turn the cam shaft in the direction to lift the pattern plate and its attachments. The weight of H should be less than is required to balance the load when the eccentric cams are at their mid-height, but it is more than sufficient to lift the load when the cams are quite up. The arrangement offers little friction, and allows the attendant to turn the crank with ease alternately in opposite directions, as required, and insures that the pattern plate shall be held reliably without other fastening at the two ends of its motion respectively. When it is up it will be held up by reason of the fact that the eccentric cams are on their centers, and the gravity of the counter-balance weight is of full effect, and when it is down it will remain down by reason of the fact that the counter-balance weight is not sufficient to overcome the gravity of the plate and its attachments in addition to the friction when the parts are in that position.

AMONG the amendments to the tariff act sent to Chairman Voorhees, of the Senate Finance Committee, by Secretary Carlisle, with a view to clearing away ambiguities and preventing litigation, is the following: In paragraph 124, relating to round iron or steel wire, after the words "sheet steel in strips" add the clause "made from wire or wire rods smaller than No. 6 wire gauge."

BY the enlargement of the Dover furnace of the Penn Iron & Coal Co., at Canal Dover, O., the stack will be made 16½x75 feet. An additional blowing engine and 750 h. p. of boiler will be put in and three fire brick stoves built. The capacity of the furnace, formerly 80 tons a day, will be increased to 200 tons. The Johnson Co. take all the output, paying a price per ton for the use of the furnace.

THE contract for the hearths, boshes and lining of the Spearman Iron Co.'s new furnace at Sharpsville, Pa., has been let to J. V. Rose, proprietor of the Sharon Fire Brick Works, who has contracted for the masonry and fire brick of the furnace, connecting flues, etc.

The A. R. Williams Machinery Co. has applied for articles of incorporation at Toronto, Ont., with a capital stock of $300,000, to build engines, boilers, motors, and all kinds of machinery and machinery supplies.

DIFFERENTIAL CHAIN PULLEY BLOCK.

The Moore Mfg. & Foundry Co., of Milwaukee, have combined in their anti-friction differential chain pulley block a number of advantages which will appear from a study of the accompanying cuts and the description which refers to them. The apparatus, its designers note, is not the old windlass block, nor a screw and worm wheel block nor a wedging pinion block, but a perpetual lever, always working at its most advantageous point. The pinion is double—two sizes in one casting. Referring to Fig. 2 it will appear that the lever is the line on which are the point A in the center of the eccentric, the point B directly below it on the pitch line of the smaller pinion, and the point C below and in line with the other two points on the pitch line of the larger pinion. The

FIG. 1.

fulcrum is an imaginary point F on the line of the lever midway between the pitch lines of the small and large pinions.

The annulars, or internal gears, are in mesh with the double pinion at points B and C on the lever. The lever operates on the annulars at these points; and, since the lift chain hangs from opposite sides of these annular wheels, they are pulling in opposite directions, one on each side of the imaginary fulcrum F. Turning the eccentric slightly, the lower part to the right and imagining the fulcrum point F stationary, the point A of the lever will move to the right, the point B of the lever will move in the same direction, but the point C being on the other side of the fulcrum, will move in an opposite direction; the two points, B and C, necessarily carrying with them the annular or lift chain wheels in opposite directions. Whatever the position of the eccentric and pinion, the relative position of this imaginary line, or lever, is always the same. There is thus in effect an infinite series of levers, corresponding in number with the number of points on the pitch line of the annular wheels. It is apparent that the load on the block exerts through this leverage a constant pressure on the side of the eccentric, and that the block will "run down" unless there is sufficient friction to prevent it.

A friction plate of slightly less diameter than the hand wheel is mounted upon a projection of the hub of the hand wheel and between it and the block frame. This friction plate is out of contact when the hand wheel is moved by the chain either to the right or left in the action of raising or lowering the load. But when the hand wheel is at rest and the pull of the load turns the eccentric shaft within the hand wheel the friction surfaces are brought into contact and movement ceases. A slight pull on the hand chain frees the brake and permits the load to descend until the shaft catches up, which it does the instant the pull on the hand chain ceases. The lock is positive and smooth working since the friction surfaces are really never out of contact, and heavy loads may be lowered by a pull on the chain of a very few pounds.

In addition to the general claims that these blocks are strong,

FIG. 2.

simple, durable, light, compact and self-sustaining at any point, the manufacturers note these points as to construction and operation: 1st. The hand and lift chains are separate and independent. The lift chain, therefore, has such a slow movement as to avoid the great wear both on chain and sprockets which necessarily follows where one chain serves both as a hand and lift chain, and, therefore travels under the full weight of the load from 40 to 100 times as fast as in these

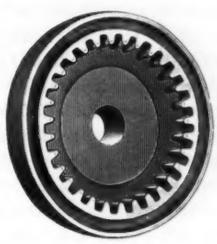


FIG. 3.

FIG. 4.

blocks. 2d. The leverage is obtained by a gear and pinion movement. There is no end thrust of a worm shaft and no wear of a worm and worm wheel. 3d. The teeth in the pinion and annulars are of the same pitch; they fit without grinding or wedging, Anti-friction rollers are placed between the eccentric and pinion to reduce friction. By this arrangement the enormous loss by friction in blocks which act on the principal of a wedge, is almost entirely overcome.

These blocks are made in nine sizes, capacities ranging from one-half ton to 10 tons.

THE American Steel Barge Co. elected the following officers at its recent meeting in New York: Colgate Hoyt, president and treasurer; Frank Rockefeller, vice-president; R. C. Wetmore, secretary; Colgate Hoyt, James C. Colgate, Henry C. Rouse, Samuel Mather, Charles L. Colby, Frank Rockefeller, Alexander McDougall, A. D. Thompson and Thomas Wilson, directors.

ROGERS, BROWN & CO., of Cincinnati, are fortunate in having identified with them Mr. Geo. K. Hosford, recently of the firm of Hosford & Pleumer, Cincinnati. Mr. Hosford is well known throughout the State, having been connected with the pig iron trade for many years. His office is No. 511 Perry-Payne Bldg., Cleveland.

ABANDONED FURNACES OF THE EAST.

The fact that 181 anthracite furnaces were carried on the effective list in 1890, while today only 130 appear in the monthly pig iron statistics, with only about one-fourth of this number active, as against 112 active, out of 181, five years ago, tells its own story of the rapid falling away of that industry in the Eastern districts which use anthracite coal or anthracite and coke in smelting pig iron. A recent issue of the Philadelphia *Record* contained this interesting statement on the subject:

The wrecking of the old Edge Hill Blast Furnace, at Edge Hill, Montgomery county, removes a familiar landmark on the line of the North Penn railroad, and adds another name to the list of abandoned iron-making enterprises with which the Schuylkill Valley is strewn. Against the great advantages of cheaper ore and fuel in the West and South the manufacture of pig iron in this vicinity has had a continuously hard struggle during the last ten to fifteen years. Twenty years ago the Lehigh valley was the largest pig-iron producing region in this country. New York State stood second, and the Schuylkill Valley stood third. The Lehigh and Schuylkill Valleys together produced more pig iron than any entire State, outside of Pennsylvania, and their joint output was more than one-fourth of the whole product of the country. Last year the Schuylkill Valley stood twelfth in the list of pig-iron producing regions, and the Lehigh Valley was in the fourteenth place. The production of the Schuylkill Valley for ten years past will indicate the course of the industry in this vicinity:

	Gross tons.		Gross tons.
1885	182,894	1890	541,005
1886	351,379	1891	519,190
1887	464 020	1892	448,201
1888	427,914	1893	415,542
1889	412,127	1894	273,504

Anthracite pig iron, the chief product of the Schuylkill Valley furnaces, has declined one-half in price in this market in twenty years, but anthracite coal, which is the chief dependence of the pig-iron industry of Eastern Pennsylvania, has not cheapened perceptibly since the beginning of that period. In intervening years it has been both higher and lower than at present. There has been some advantage in the decrease in cost of Lake Superior iron ores, which these furnaces have been compelled to use because of the low grade of the local ores and the tariff on richer foreign ores, and within the past six months additional advantage has come from the reduction in duty on iron ore from 75 to 40 cents per ton. The importance of this reduction may be realized when it is stated that the saving of 35 cents per ton in duty would make a difference of probably $40,000 a year in the cost of ore consumed by such a plant as the two furnaces of Heckscher & Sons, at Swedeland, assuming that they were to use foreign ore exclusively. But the high cost of fuel still remains the greatest obstacle to profitable pig iron manufactured in this vicinity, for the cost of anthracite remains practically the same year after year, and if coke is used the furnace operators must pay the railroads for hauling it from Connellsville nearly two and one-half times as much as the coke itself costs at the ovens where it is made.

With these facts to consider, it is not surprising that only one blast furnace has been built in the Schuylkill Valley in the past 15 years, while not less than 33 stacks have been abandoned in that time. More blast furnaces are in ruins than are in operation or likely to operate in the valley today. The new stack erected at Swedeland four years ago by Heckscher & Sons is the only furnace built in the Schuylkill Valley in nearly 20 years, unless the furnace at Chester be considered as within the region. Many of the older plants have been rebuilt or remodeled from time to time, but no new concern has engaged in the manufacture of pig iron as a new enterprise, while many have retired from the business in the past 15 years. During the last generation many substantial fortunes were made out of pig iron in Eastern Pennsylvania, but establishments in this section have had to struggle hard, and not always with success, to preserve the property acquired in former profitable business.

The mere enumeration of the abandoned and dismantled blast furnaces in the Schuylkill Valley tells a pointed story of the decline in the industry. What can be seen from a car window in a day's journey through the valley is the most striking. Berks county, still the most active iron producing region hereabouts, leads in the number of abandoned plants. At least 14 blast furnaces in that county have been abandoned, and many of them dismantled in the last 10 or 15 years. [The 14 furnaces above referred to are then mentioned and located. In Schuylkill county seven are named; in Montgomery, nine, last of these to fall into the hands of the junk-dealer being the Edge Hill furnace; one in Philadelphia, dismantled in 1889; two at Riegelsville, Bucks county, forming part of the Durham Iron works. A list of abandoned rolling mills, representing the destruction of a large amount of capital, is also given. It includes those of the Philadelphia Iron & Steel Co., Gray's Ferry Iron Works, James Rowland & Co.'s plant and the Keystone Horse Shoe Co., all in Philadelphia; the Standard Iron Co.'s mill at Norristown; the Hamburg mill and the Pine Iron Works in Berks County; the Hibernia mill at Wagontown and the West Brandywine iron works at Coatesville, in Chester county; in Schuylkill county, the Greenwood mill at Tamaqua, the Mount Carbon mill, the Palo Alto at Pottsville and the Port Carbon iron works at Port Carbon. In conclusion the article has the following paragraph about conditions today:]

That the local conditions in this vicinity are such as to permit the profitable operation of rolling mills and steel works in competition with any section of the country is demonstrated by the enormous expansion of the business of many of the establishments in the Schuylkill valley and adjacent points, notably at Pencoyd, Midvale, Pottstown, Coatesville and Reading. At least a dozen entirely new rolling mills or steel plants have been built in this vicinity in the past 15 years, and many of the older establishments have more than doubled their capacity in that time. That several of the largest concerns have gone down under the pressure of the recent financial disturbance does not argue against the local conditions, for even those localities regarded as most advantageous for the iron industry have had a similar experience.

Received from the Trade.

Warren Webster & Co., of Camden, N. J., who make a specialty of examining steam plants with a view to equipping them for the most efficient and economical operation, through the heating of feed water, have set forth information of value in this direction in their pamphlet "Exhaust Steam Economy." The installation of 400,000 horse power of the "Vacuum" feed-water heater and purifier, in the past six years, is the basis for the confident claims made for this firm's system. The fact that these installations are made on a plan that makes payment contingent on the economies resulting has secured the rapid introduction of the apparatus, and the result has been, not only that no outlay has been required by the purchaser, but that a profit has been yielded. Another field in which the company has operated successfully, is in the warming of buildings through the use of exhaust steam without back pressure upon the engines, irrespective of heaters or systems now employed. In the pamphlet before us, a detailed description is given of Warren Webster & Co.'s systems, together with a list of concerns having them in use and the opinions of those who have practically tested them.

The steel key envelope opener sent out by the Union Lock Co., Ltd., of Lancaster, Pa., is a unique trade reminder that will find a permanent place on the desks to which it comes.

The Lodge & Shipley Machine Tool Co., Cincinnati, O., whose specialty is lathes, are circulating a bright booklet devoted to an illustration and description, under appropriate headings, of their latest line of engine lathes. They announce on the last page "a line of drills as much improved as the lathes described," and chucking lathes "that will save from 30 to 80 per cent of the cost of boring on every machine built."

The Swarts Metal Refining Co. takes the place of the "Swarts Metal Co." as the name of the well-known Chicago firm who manufacture, export and job Babbitt metal, solder, pig lead, pig tin, stereotype and electrotype metal, spelter, cotton waste, etc. They have decided to do their own refining, so great is the demand upon them in that direction. The new departure is announced in a cloth-bound catalogue just issued by the company, containing a number of new features interesting to consumers of metals. The highest grades of metals for high-speed engines, dynamos, rolling mills, vessels, railways and machine shops are supplied by the company from their larger and more centrally located quarters at 120 W. Lake st., Chicago.

THE TIN PLATE SITUATION.

In reply to the communication of "I. R. S." which appeared in *The Iron Trade Review* of Feb. 21, our correspondent "Cinders" makes the following statement:

The article which appeared in these columns Jan. 3 under the caption of "The American Tin Plate Industry," was written by a man of wide experience, both in the United States and abroad, and it is the criticism of "I. R. S." which is erroneous and not the figures of "Cinders," as the following replies to the statements of "I. R. S." will show. The charges are specified and answered separately.

First charge: "I. R. S." charges "Cinders" with misuse of facts, especially in regard to the producing capacity of the United States. He states that there are only 70 mills in this country, against the statement of "Cinders" that there are 120 mills or stands of rolls either in operation or under construction.

Answer: There are now in this country 88 mills either in operation or ready for operation, 37 mills are in course of construction, and will be ready for operation between March and September this year. "I. R. S." will find this statement correct if he will add to his list the mills at Bridgeport, Cleveland, Niles, New Lisbon and one more than he states at Cambridge, (all in Ohio); 15 mills in Pennsylvania, (Kensington, Blairsville, Pittsburg, and two additional mills at Ellwood, Pa.), three at Joliet, Ill., four at Middletown, Ind., and a few more than he states at Anderson, Ind. These mills are, or will be, capable of turning out 5,250 lbs. of I. C. black plates during one turn of eight hours. To be on the safe side, the estimated production is placed at 5,000 lbs. per turn of 7½ net tons per day. Mills work 5⅓ days each week, making the output per mill per week 40 tons net. Multiplied by the number of mills that will be in operation this year (125), the total weekly production is found to be 500 tons per week. Allowing six weeks lay off per year for each mill, the annual production would be 230,000 tons, or more than the quantity of plates imported into the United States during the year ending June 30, 1894, as is shown by the figures presented in the reports of the special agent of the Treasury.

Tin and terne plates imported in the quarter end ng:

Sept. 30, 1893	121,885,899 lbs.
Dec. 31, 1893	83,846,383 "
March 31, 1894	107,522,790 "
June 30, 1894	119,556,088 "
	432,811,160

Or 216,405 net tons.

The figures used here are official, and the figures in regard to the capacity of American mills can be proven. It is stated in *The Iron Age* of Feb. 21, that the three mills at Cambridge, O., turned out 212 tons during the fourth and fifth weeks of operation. [These figures are officially verified.—ED.]

Second charge: "I. R. S." charges that the statement of "Cinders" that American workmen can turn out as good work and even better than skilled foreign workmen, is too far away to discuss.

Answer: On the contrary, it is a plain fact, "Cinders" does not claim that foreign workmen cannot do good work, but he does boldly assert that the majority of foreign workmen who are successful in this country, are those who have been here long enough to become naturalized and learn its ways. An Ohio mill that is making a good record, has at the rolls an Irishman, some Englishmen, Germans, three native Americans and some Welshmen who have spent from six to ten years in this country. There are also sons of Welshmen born here who are doing splendid work, although they have never seen a Welsh mill. "Cinders" does not belittle the value of good foreign workmen, but he is proud of the achievements of Americans alongside them. In regard to the statement of "I. R. S.," that "two of the most influential and zealous Americans made a special trip to Wales last summer in search of skilled workmen." He had better keep their names a secret, as such an act is a direct violation of the Contract Labor Act, which iron and steel workers helped push through Congress a few years ago. The two gentlemen might get themselves into trouble. It seems strange that "influential Americans" should so far forget themselves.

Third charge: "I. R. S." makes complaint against "Cinders" for stating that improvements have been made in machinery.

Answer: The statement of "Cinders" is true, but as he is not in the advertising business and these pages are not devoted to that purpose except in proper places, it would not be consistent to advance the claims of any particular machine in his reply. "I. R. S." must bear this in mind, that it is not the length of time employed in a certain line of business that makes an expert, so much as the manner in which experience is applied. There is much credit due to Welshmen for their skill, but it is surprising how quickly Americans avail themselves of the years of experience gained by others, particularly in this instance.

Fourth charge: "I. R. S." takes exception to the statement that a roller can earn $10 per day under the reduced scale.

Answer: "Cinders" frankly admits that the figures are wrong. A roller who makes 5,250 pounds of I. C. plates during eight hours will earn about $7.65. "Cinders" can name a dozen or more rollers who never saw a tin mill until about a year ago who are earning that amount, eleven days out of the two weeks, and twelve days when they are second and third turn.

In conclusion, "Cinders" is glad to notice that "I. R. S." favors a reliable and well tried process for dipping, one that will turn out plates a little more expensive, but creditable to the maker. They are made at other places besides Gas City.

Will the editor kindly grant "I. R. S." the use of sufficient space to tell what has been the average time made on the 508 Welsh mills during the past five years? "Cinders" is not a prophet, nor the son of a prophet, but predicts that inside of five years America will introduce tin plates into Japan, China and the Antipodes. The secret of our success is natural wealth, abundance of Bessemer ore and consequent production of excellent steel bars at less cost than in England and Wales. Necessary reduction in wages of rollers and others will do the rest.

Steel for Boilers.

Within the past decade the use of open-hearth steel has almost entirely superseded all other materials for boiler-making purposes, owing to its extreme toughness and ductility, and the combination of maximum tensile strength with these qualities. When steel was first used for this purpose high tensile strength was considered to be of prime importance, but it was soon found that toughness and ductility were of more essential value.

The first boiler steel specifications called for metal having a tensile strength of 60,000 pounds per square inch, without much being demanded in the way of percentage of elongation, although hot and cold bending tests were specified. It was found in practice that these sheets cracked easily, especially when subjected to the sudden coolings due to blowing off and washing out hot—as was, of necessity, done with many locomotive boilers, particularly in cases where the waters used were very muddy and carried much lime and other impurities in mechanical suspension. For a while, therefore, steel was generally discredited for boiler making. Later on it was found that a steel possessing from 50,000 to 55,000 pounds tensile strength and an elongation not below 25 per cent in 4 inches, and sufficiently low in carbon and other hardening constituents to allow of being heated to a dull cherry-red and plunged into cold water (60 degrees F.) without hardening so far that a piece of half-inch metal would bend double without showing signs of cracking, was a much more desirable material in every way for fire-box and other stayed sheets, more especially those subjected to the direct action of the fire. A sheet as low as from 45,000 to 50,000 pounds tensile strength and an elongation of from 25 to 30 per cent. in 8 inches gave the best results.—[Wm. O. Webber, in Cassier's Magazine.

PRESIDENT GARLAND endeavored to secure arbitration of the dispute between the Tudor Iron Works, East St. Louis, and their 600 workmen who had been on a strike for six weeks, but President Meysenburg said there was nothing to arbitrate. The spike mill has started up with non-union men.

THE Lassig Bridge & Iron Works, of Chicago, will resume operations this week, after being shut down for two months. These works were never shut down before since their establishment in 1882, except for a few weeks in last May. About 125 men will be put at work.

BENCH MOLDING.

BY J. W. DEARSLEY, RACINE, WIS.

The time has come when bench molding should be brought to the surface and classed where it belongs. For years this class of foundry work has been buried, in foundry writing and discussion, under articles devoted to heavier classes of work, that are a part, but only a part, of what goes to make foundry practice complete. These same articles have been interesting and instructive, and they have proved beyond a doubt that there are just as bright and level-headed men among the foundrymen of the country as in any other branch of metallurgical operations. The writers have devoted their lives to the advancement of this important interest and will continue to do so. What is wanted is that they shall recognize bench molding by going into print now and then with comments on that branch of the business. Surely the scantiness of literature on bench molding is not for want of topics. There is not a single article belonging to that branch of the craft but would furnish plenty of material for a column or more.

Castings made on the bench bring the student of that branch of molding through more departments, and very often through more operations, than are involved in making larger castings. Good judgment must be used from the outlines of a piece of work, as they leave the draughtsman's hands, up to the finished casting. It is true the same can be said of all classes of work; but castings, no matter how small, when they are to be produced in large quantities, call on the foundryman for a longer look ahead than anything I know of.

Take a set of small castings and run over the questions they force upon you. The first that comes up is, How many can be molded with safety in one snap? Then, What is the proper metal from which to make the patterns? We have a large variety to select from. Aluminium is trying hard to find a place among them. Then as to the gating—there are nearly as many ways of doing that part of the work as there are foundries producing castings. We must try to save all the machine work we can, as this is the age of producing near y finished castings in the foundry. How will we accomplish it? Will a chill do? or is the casting of such a nature that a chill would weaken or crack it? We do not want to go to the core room if we can help it. At the same time we find there something that will do when chills and green sand cores fail. A modern core room, properly equipped, is one of the essentials of a modern foundry. At the same time it is policy to use as few cores as possible, and have them of material that will affect the sand heaps the least, at the same time giving the part cored as nearly as possible the same finish as the rest of the casting. The chill in many cases is far better than the core. We must know when and where to use either. What a wide range of discretion is found in the core room—as to which is the best of the different fixtures in use. The countless mixtures of sands and compounds that furnish us with cores of all sizes, each has its merits and its appropriate place.

And the core boxes for small work—we must not turn them down. The making of the core boxes has been brought to a science. Parting lines have been found on cores that would seem almost impossible to mold, and devices for securing while filling, and the different modes of insuring a positive vent. How many cores can be produced with a single operation? How can they be supported securely enough to prevent any variation in shape? Many a small casting will compel the resort to devices that never were thought of before. The rattling or cleaning room is one of the principal agents in producing good work. The orders do not call for the rounding of all sharp corners before the casting is half cleaned; they call for duplicates of the pattern worked. Some, I am sorry to say, are not satisfied with that; there are those who do not believe in finishing a pattern before sending it to the foundry. The day has gone by when patterns were designed to suit the foundryman's taste. He takes them as they come, for he is fully alive to the fact that a casting of any conceivable form can be molded, and that ends it. The only good excuse he has left is that it is out of proportion, which in many cases is true. That will be overcome when we get iron that will not shrink.

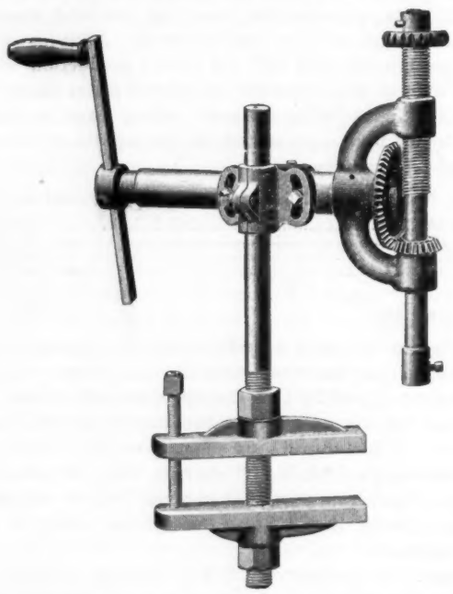
Where can we find a better opportunity for special appliances than in bench work? Step into any foundry and you will find one or more jobs that have demanded special attention through competition, and the foundryman has succeeded in getting a practical way of handling them. Yet we do not hear of them except when the originator covers them with patents and wants us all to try them. And he succeeds in many instances in convincing a proprietor that there is a million in it, to the sorrow, probably, of a No. 1 foundryman. Some firms would buy a shop right to make Scotch pig out of burnt grate bars, and think they had made a very clever move. Give us the things that are practical. The man who says, It will not work; there is no use of trying—will soon find himself classed among relics of antiquity. A machine that will do the work is a tool that can be afforded, while a machine that is not practical is worse than nothing. A foundry has no room for mere storage.

How thoroughly disappointed is the foundryman when he gets a good view of his gates in the gangway stripped of their castings and realizes that there is fully 30 per cent more iron in them than is necessary to do the work. And when he figures what those gates cost, he begins to think that the gating of small castings is nearly as interesting a study as the test bar.

When all is summed up it will appear that that set of small castings will keep a painstaking foundryman almost as busy as your piece of heavy work that gets so much attention because so much is staked on its successful completion.

CLAMP DRILLS.

A clamp drill is a tool that is found, or ought to be, in every well regulated machine shop, cotton or woolen factory, paper mills, steam and street railways, bridge building and structural work, in fact they are used in a greater variety of places than



any other tool. It is a tool that is not in constant use, but when there is use for it, it is almost indispensable.

In making the clamp drill, two important features are strength and lightness, and by a liberal use of malleable iron, these two features have been united in the tool here illustrated to a much greater degree than possible when cast iron is used. Another important advantage of these drills, is the swivel motion in the cross section, shown in the cut, which allows the operator to square his drill to his work, regardless of the clamps. The posts, spindles and shafts are made of steel. The clamps and swivels are malleable iron. They drill at any angle. Each style is made in two sizes, thereby covering a wide range of work. The posts of Nos. 1 and 3 are 1¼ inches, and the drill sockets take ½ straight shank drill bits. No. 2 and No. 4 have 1½ inch posts and the drill sockets take 41-64 straight shank drill bits.

They are for sale by the Manufacturers' Tool Supply Co., 17 S. Canal St., Chicago.

THE Westmoreland Fire Brick Co., Hamilton Bldg., Pittsburg, is furnishing fire brick for a third Foote stove, which is being erected by the Clinton Iron & Steel Co., of Pittsburg.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, Feb. 20, 1895, at the Great Northern Hotel, Chicago. In the absence of the president, Mr. C. A. Sercomb, vice president, occupied the chair.

Among those present were the following: C. A. Sercomb, Schwab & Sercomb, Milwaukee; J. L. Hecht, H. L. Hotchkiss, Wm. Deering & Co., Chicago; Jno. T. Rowlands, J. I. Case Threshing Machine Co., Racine, Wis.; A. W. McArthur, Rockford Foundry Co., Rockford, Ill.; Jas. Frake, Chicago; S. T. Johnston, Whiting Foundry Equipment Co., Chicago; O. T. Stantial, Illinois Malleable Iron Co., Chicago; W. C. Waterbury, E. C. Louis, Forster, Hawes & Co., Chicago; Geo. H. Sargent, the Sargent Co., Chicago; F. C. Patten, A. N. Wheeler, F. C. Patten & Co., Sycamore, Ill.; F. W. Harrower, Chicago; W. N. Moore, Joliet Stove Works, Joliet, Ill.: E. H. Walker, Emerson, Talcott & Co., Rockford, Ill.; O. H. Barry, A. M. Thomson, Link-Belt Machinery Co., Chicago; J. H. Dalton, Walburn Swenson Co., Chicago; D. L. De La Fontaine, Crane Co., Chicago; B. M. Gardner, *The Iron Trade Review*, Chicago.

An application for membership was read from the Link Belt Machinery Co., of Chicago. On motion, this company was unanimously elected as a member of the Association.

The secretary read a statement, charging that the paper read at the last meeting was not an original paper but taken almost entirely from C. W. Sisson's "A B C of Iron." It was moved and carried that the chair appoint a committee of three to examine the paper in connection with the book, and to investigate the charge. The chair appointed Mr. O. T. Stantial, Mr. S. T. Johnston and Mr. James Frake.

The secretary announced that the meeting was called as a "question meeting" and that the members had been asked to bring any questions they might have relating to foundry practice that they desired light upon.

The first question was then presented: "What gives one molding sand longer life than another under same conditions of use?"

Mr. Rowlands, being called on to answer, said: It depends somewhat on the grade of the sand. Very close sand is not as strong as that which is more open. The closer the sand is the weaker it is; the coarser the stronger.

Mr. McArthur: Strong sand is strong in clay. I have always considered the clay in the sand to be its wearing quality.

Mr. Rowlands: I agree with Mr. McArthur that the more loam the stronger it is. The finer the sand the weaker.

Mr. McArthur: You have a sand that is heavy and lifeless and to give it strength and life you add to it a sand that is strong in clay; sometimes you add clay itself.

Mr. Hotchkiss: This seems to me purely a chemical question. Of course every foundryman could tell which is the strong sand and which is the weak; but unless he has chemical knowledge of the sand, it would be impossible to give the real reasons. The amount of clay in it may have something to do with it. Another thing I think is the amount of foreign matter—that which is not pure sand or clay. I think a chemist could tell about the different properties.

Mr. Moore: I suppose that a sand which is composed entirely of silica and alumina, which are both refractory materials, will give the longest life in the foundry. I think all sands are permeated with more or less vegetable mould which burns off, and whether what is left is a detriment to the sand and thereby impairs its usefulness, I don't know. I don't know about the other things, but I have an opinion. I think the difference between the life of the sands lies largely in their composition and that those that are composed wholly of silica and alumina have the longest life. In fine sands we have today the Ohio river sands and sands which come from various parts of Ohio, which work very nicely in the foundry, and which, so far as our experience goes vary in life. I think the same is true of all our Ohio river sands. I noticed some time ago when down in Alabama, some very nice and very fine machinery castings. They were very clean and free from burnt sand, (and the foundry was not a first-class foundry by any means,) and it seems that the sand had a good deal to do with it. It seems that the sand is made up—that the binder has a good deal of iron ore in it. How much there is in ours I do not know.

Mr. Stantial: There was a time when I thought I knew something about sands, but when I started to analyze them I found that I did not know so much. I had an idea that lime was injurious to sand. I got hold of some sand containing a large percentage of lime and found it was the best sand I ever used.

Mr. McArthur: I would like to ask Mr. Stantial whether it was strong or weak.

Mr. Stantial: It was a strong, fine sand. It was not very clayey. It was so fine that it had the appearance of being clayey, but when we came to use it, it was quite open and our castings came out in good shape. They were light castings.

The investigating committee appointed by the chair in the early part of the meeting returned and presented the following report:

"Your committee respectfully report that they have compared the paper presented by Mr. Chas. Johnson with Sisson's "A. B. C. of Iron," and find that it is almost entirely copied from that book. We therefore recommend that the following resolution be adopted and that the secretary be authorized to carry out its instructions.

"*Resolved:* It having been found that the paper by Mr. Charles Johnson, read at the last meeting of this association, should not have been presented as an original paper, the secretary is instructed to withdraw it from the records of the association, together with all resolutions relative thereto.

Respectfully submitted,
O. T. STANTIAL,
S. T. JOHNSON,
JAMES FRAKE."

On motion, duly seconded, the report of the committee was adopted and ordered spread upon the records.

The secretary then read the second question, as follows:

"We understand it is customary to melt cast-iron turnings or chips in the cupola, instead of selling them to rolling mills as heretofore. Do you know how this is, and into what form or shape these iron turnings are put, to use them in the cupola? Unless something of this kind was done, it seems to us a large proportion of them would be wasted."

Mr. Sercomb: All cast iron turnings and borings I sell to dealers. What disposition they make of it I do not know.

Mr. Stantial: We melt up our cast iron borings, throwing in a little at every charge. We do not know whether they come out of the tap-hole or the slag-hole.

Mr. Thompson: I should like to ask Mr. Stantial if he puts these into the cupola while the blast is on?

Mr. Stantial: Yes, a little in each charge.

Mr. Thompson: I have seen cast iron borings put into the cupola, but the blast was stopped. I do not think it pays for the trouble. Most of it, I believe, goes through the slag-hole.

Mr. Rowlands: We have a good deal, but we sell it to the junk shops.

The secretary read the third question, as follows: "A certain concern has been using a mixture about as follows for the past year or more: 100 tons Lake Superior coke, No. 2 foundry; 100 tons Southern No. 1 soft; 150 tons Southern No. 3 foundry and Connellsville coke. The test bars from this mixture have always been up to standard, showing uniformity of strength and fracture and the work turned out has been perfectly satisfactory, until two weeks ago, when spongy spots were discovered in the castings; sometimes in the center and sometimes on the surface of the casting. The irons were analyzed and found to be all right in that respect. What is the trouble, and how can it be remedied? The concern makes heavy machinery castings."

Mr. Hecht: It seems to me that if a man had iron with spongy spots in it, it would be because his iron was not homogeneous and did not run uniform, or he did not get it properly mixed in the cupola.

Mr. Moore: The inquiry says that the analysis is all right. If the analysis had been given, we migh then give various reasons according to our understanding of the subject as to what was the trouble.

Mr. Gardner: I tried to get the analysis, but I could not. I found that the iron was the same class that they had been using the previous year when the iron had been running all right.

Mr. Moore: I would advance an explanation of the thing

which is contrary to the statement made that the analysis is all right. I do not believe it is. In the absence of complete data as to the trouble I do not see how we can discuss the subject intelligently, except on the broad ground as to what causes porous or spongy spots in castings, and it seems to me that if any one has had experience in castings and has been able to remedy that defect, it might apply in this case. I do not believe the parties used the same iron that they did when their castings were running all right.

Mr. Gardner: The trouble occurred after they had used half of the iron. It was in the middle of the purchase that these spots occurred.

Mr. Moore: Iron does not run uniform from the same furnace in some important elements. Iron is made in different stacks and is sometimes shipped as one batch. The change may not work any harm and then again the change is enough to throw an element of trouble into the mixture.

Mr. Sercomb: I think Mr. Moore is right. I used an iron for a year and a half and all of a sudden it went wrong and I had to refuse some 500 tons. I had a great deal of trouble and it cost me quite a little money. The elements were not in the iron that should have been.

Mr. Frake: I read an article some time ago which stated that a remedy for these porous, spongy spots was to put in some scrap or stove-plate. I do not know why. I would like to hear the experience of some of these gentlemen on this subject.

Mr. Thompson: Assuming that the iron is all right, I would like to know what is the cause of spongy iron. If the mold is properly made and the cause does not come from that, what are the elements in cast iron that would make it spongy?

Mr. Hecht: I hardly know what is meant by spongy castings. Speaking of spongy spots makes me think of some semi-steel that came to my notice. I have come in contact with this many times but never thought of calling it semi-steel. To my mind it is nothing more than a transition state of gray iron to white iron. In fact, it is nothing more than white iron containing spots of graphitic carbon. I suppose those might be called spongy spots.

Mr. Frake: Will scrap do away with that?

Mr. Hecht: It depends upon the nature of the scrap. I should say sufficient steel scrap would produce an iron that would not show any graphitic carbon in the fracture.

Mr. Rowlands: In regard to scrap, I have been bothered considerably with what is chemically termed black lead. I find that scrap does away with it. I use machine scrap; I do not use stove-plate. I find by using certain proportions of machinery scrap I am not bothered.

Mr. Frake: I use stove-plate. The article I referred to said that you could notice the lead or carbon on the top of the ladle, and that by throwing in stove-plate it would disappear, that it would be absorbed by the stove-plate.

Mr. Sercomb: Can any of you tell me what is the percentage of loss between stove-plate and heavy machinery scrap?

Mr. Stantial: As far as stove-plate goes, I have made experiments and find the loss about 13 per cent.

Mr. Moore: How do you account for the loss, by oxidization or dirt?

Mr. Stantial: Both. Stove-plate, as it comes to you, is rusty and has considerable dirt clinging to it and a great deal of oxidization.

Mr. Moore: With reference to porous spots, where they are caused by an excess of graphitic carbon, I have understood from others, as well as from the gentleman who has spoken here to-night, that it is advantageous to put in scrap; and the explanation of that, as I understand it, is that the mixture as used has been too rich in carbon, the parties having used a better grade of iron than they really required or that it was advantageous to use, and by putting in the scrap they reduced the carbon. I can see some reasons why stove plate scrap might be better than machinery. Stove plate iron, as it is generally made, is as rich in free carbon as any iron that is used. In the scrap there is always a coating of rust on the inside of the plates, and generally some sulphur in the rust. I never heard of any good use of sulphur, but possibly there may be cases where an increase in sulphur may work advantageously in overcoming a great amount of free carbon. Where it is remelted it is necessary to do away with it, and what sulphur goes in with old stove plate has a tendency to keep it down. I do not see any other reason why stove-plate would be any better than other scrap for the purpose.

Mr. Dalton: I think there was too much open Southern iron in the charges with which trouble was had. In a great many cases in making ammonia cylinders there have been times when the iron has had to be remelted before putting in the cylinder in the second charge.

Mr. Stantial: I believe the analyses they speak about were not complete. I do not believe they have made the carbon determination to show how much graphite there was in the iron. I believe those porous castings are caused by an excess of graphite. We often see pig iron with cavities that you can place your hand in and they are caused by an access of graphite.

Mr. Hotchkiss: It would be impossible for me to tell the reason, unless I knew just what they meant by sponginess. It could be caused, as Mr. Stantial says, by the excess of graphite. Of course, by looking at the casting a person could tell whether that was the trouble. It might be, as Mr. Hecht said, that the iron was not properly mixed in the cupola. It is very easy to put a charge in so that it will not come out properly mixed, Possibly the iron that was high in graphitic carbon came out in these castings. Of course, if it was a shrinkage it would be the opposite.

Mr. Gardner: I noticed some castings in your office, Mr. Waterbury, with holes in them. Do you know what caused the spots or what remedy was applied?

Mr. Waterbury: We advised the use of a lower grade of iron. We thought the iron our customer was using was too rich. Those small castings were made from No. 1, and we suggested No. 2.

Mr. Gardner: I have a letter here from the president of the Illinois Malleable Iron Co., which I should like to read:

"MR. B. M. GARDNER,

1141 Monadnock Bldg., City.

Dear Sir: We have been suffering from boys pilfering patterns to sell for junk and we presume that nearly every foundry in the city or in any large town suffers more or less in this direction. Do you not think you could serve the interests of your members by getting up a petition to legislature now in session, and have a law passed making it a criminal offense to buy scrap metal from boys? We believe there is such a law making it a penal offense to buy lead pipe from boys. Kindly give this matter consideration. We have a letter from Deere Co., Moline, Ill., stating that they have suffered in the same way and would be glad to co-operate in a move to get such a law passed. Yours truly,

(Signed) H. E. BULLOCK, Pres.

Is there any desire on the part of the association to take up this question?

Mr. Moore: I would doubt the advisability of the movement as suggested, because I do not believe it would meet with any practical results. There is one way to overcome that in any foundry and that is to keep patterns under lock and key. I do not know that this is possible in every foundry. In our own case, to prevent the pillage by possible thieves and loss by fire, we keep them in a fire-proof vault with a combination lock, and every pattern is put there every night. I cannot really appreciate the conditions under which such loss could occur to any great degree. Even though the law were passed I fear it would be like a great many other laws; it would not be enforced.

Mr. McArthur: When I received the secretary's letter, the first thing my mind turned to was how the cost accounts are kept by the different foundrymen. If they have any systems I would like to hear of them.

Mr. Thompson: The subject of the cost of castings in the foundry is one that often comes up. We are often asked to give the pound cost of castings. I think there is a system that is called the Messersmith system that gives a good way of ascertaining the foundry costs. I think our system is taken from it. I could not give an explanation of it tonight, but I would recommend that work to any one wishing to study up the subject. It can be purchased in this city. It is quite a difficult matter to keep account of the costs.

Mr. McArthur: Some parts of the cost accounts are very simple. I had in mind when I asked the question to find out how different members kept account of the labor, molders, plant, taxes, etc. In my own system I have kept track of such things for a term of months and found out just how much in pounds the incidental charges amounted to and figured from

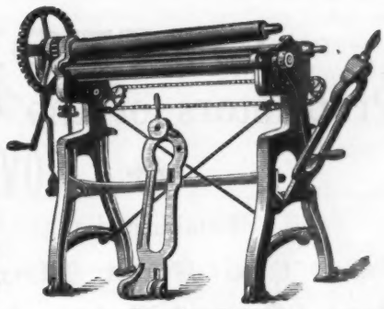
Machines for Working Sheet Metal.

Patent Gap Shears.

Patent Gap Shears, Especially designed for Squaring, Trimming and Slitting. 6 to 18 inch throat for Slitting Wide Sheets. Complete for Tinor Iron, o 14 gauge. Seven Styles of various lengths HAND AND POWER.

General Purpose Punch and Shear. Seven Sizes.

Rear Side.


Forming Rolls.

General Purpose Forming Rolls, all sizes. Quickly adjusted and instantly opened—A Revolution. Also Patent Crimping Rolls. Beware of Infringements.

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BY USING
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LIGHTNING LIFTING SCREWS. TAPER THREAD.

THE FOUR C's BOILER COMPOUNDS
FOR PREVENTION OF SCALING AND REMOVING SCALE ALREADY FORMED.
We make a specialty of manufacturing compounds suited to the different classes of water we are called upon to treat. All waters analyzed free of charge to our customers.
CONSULTING CHEMISTS,
Dickman & Mackenzie, Rookery, Chicago.
CHICAGO COMPOUND & CHEMICAL CO.,
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JOHN FRASER,
MECHANICAL ENGINEER and DESIGNER of
STEAM AND HYDRAULIC MACHINERY.
DESIGNING FOR
Steel Works, Rolling Mills and Blast Furnaces
A SPECIALTY.
1436 Monadnock, - - CHICAGO.

that. All such things in our foundry are charged up every day. Every job that comes into the shop is made a ledger account, to which is charged molding, iron, etc., as deliveries are made, and to which credits are passed from the journals; so that we are able to tell, if our system is correct, what any job has cost us, and at the end whether we made or lost on it. In meeting competition I have had reason to believe that a great many foundrymen do not keep an account.

Mr. Rowlands: We have a very thorough cost system, but I could not go into details here tonight. I would be glad to get a statement from my company. Every piece of board I get is charged against me, and every foreman is very careful how many pieces he gets. We have every pattern in the shop numbered and lettered. We keep close track of the fuel and then of the melting and of the refuse that is returned again.

Mr. Stantial: We make every job that comes in stand on its own base, pay for itself. We do not take one job at a loss and another at a profit. We take the cost of melted iron, which includes iron, fuel, melting and interest on cupola, molding, molding expense, cores and core expense, general labor, and general expense. Molding expense includes our material, such as sand, etc.

Mr. Frake: You have to estimate that to a certain extent.

Mr. Stantial: No, we do not estimate; we take our purchase books for the year and go over them thoroughly.

Mr. Frake: At the end of a year's work you could go to work and say so much for labor, so much for space, so much for tumbling, so much for this and that, and then say that this man turned out so many castings during that time and the average casting would be so much per pound.

Mr. Thompson: How do you estimate on a new piece of work?

Mr. Stantial: On a new piece of small work we have a sample submitted. For large work we have specifications submitted. We figure on that. We have the weight per mold. We have the estimate of our foundry foreman as to how many molds a molder can put up a day and what he would pay per mold. From this we figure the cost.

Mr. Moore: I think this subject is one of great importance and should not be disposed of this evening. I have felt that it was one of the things that we are coming to sooner or later, and I think there is no subject that we have discussed or can discuss which can bring more benefit, into which we can enter with more interest than the subject of costs, and particular cost systems. There are foundrymen, and probably others engaged in other lines of business, at the present time who are making prices on their work or product which it is impossible to meet. The man that takes in work any way, at the best price he can get, cannot be influenced by the knowledge of what the work costs him. I sincerely hope that we shall be able to have some of the systems that are in vogue presented here in detail, and that we can discuss the systems in detail.

Mr. Gardner: The subject has been presented several times with the request that it be brought up for discussion at an early meeting and I intended to do so by the following means: I propose to write to all the members of the Association asking them to send in a copy of their blank cost sheet, and I propose to get copies of blank cost sheets from all parts of the country and present them to the meeting. I think that would be probably the best way to do it, but if any one has any suggestions to make I would be very glad indeed to avail myself of them. While I am on the subject I would like it very much if those members who are present would send me their blank cost sheets so that I can have them when the question comes up again. Submit them without names, if you prefer.

It was decided that the "question meeting" be continued as far as possible at the next meeting. The meeting then adjourned.

The Scottdale Iron & Steel Co., of Scottdale, Pa., has under erection a cold rolling mill, which is being built by the A. Garrison Foundry Co., of Pittsburg, to be connected with one of the present cold roll trains. This mill will be put in operation in the course of a week or so.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

GOVERNMENT ✦ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—MOUNT SAVAGE, Allegany County, Md.

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Ferguson Block, Pittsburgh, Pa., Stowe, Fuller & Co., 195 Merwin St., Cleveland, Ohio.

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HIGH GRADE FIRE BRICK for

Rolling Mills, Steel Works, Blast Furnaces, Cupola Linings, Boiler Settings.

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Our large capacity, 8,000,000 annually, and modern plant, enable us to handle contracts of any size promptly.

Ground or Calcined Clay in Sacks or Bulk.

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WESTERN AGENTS OF

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The leading BRICK of this country.

MANUFACTURERS OF

OHIO FIRE BRICK. ALL SHAPES IN STOCK.

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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

C. C. Foster, Warsaw, Ind., wants to buy a 4 or 6 h. p. second-hand gasoline engine.

S. S. Start, Elgin, Ill., is in the market for a 50 to 60 horse power boiler and a 25 horse power engine.

F. and R. Lazarus & Co., of Columbus, O., will receive bids for a 400 horse power steam plant, consisting of engines, boilers, pumps, etc.

Hoyt & Little Cannel Coal Co., of Clearfield, Pa., is putting up a new building, which will be equipped with machinery, for which bids are asked.

The Thomas-Scholz Coal Co., of Mammoth, W. Va., is about to purchase mine screens, 20-pound steel rails, scales, mine cars and corrugated roofing.

The G. W. McCoole Mfg. Co., St. Louis, is in the market for an automatic machine for cutting No. 11 wire into 14-inch or 16-inch lengths and making them into chain.

At the office of the Supervising Architect, Washington, D. C., sealed proposals will be received until 2 P. M., March 22, 1895, for the iron work, wood floor, ceiling and roof construction and roof covering for the superstructure of the U. S. Court House, Postoffice and Custom House at Sioux City, Ia.

The Board of Trade of Carbondale, Pa., has succeeded in locating in that city the Pendleton Mfg. Co., of New York, manufacturers of the Pendleton steel spinning bobbin, whose plant at 501 West 50th st. was destroyed by fire Jan. 19. The machinery is now being placed and the company will be ready to fill orders about March 1 at the rate of 1,000 bobbins a day. The plant is equipped with Bliss and Ferracute drawing presses and a modern machine shop outfit. About 20 hands will be employed at present, but it is likely that the plant will be largely increased in the course of a few months. The company have orders ahead for about 150,000 bobbins for the silk throwing trade. Cornelius S. Mitchell is president of the company; Henry D. Klots, secretary and treasurer; and Gurdon Pendleton, Jr., managing director.

New Construction:—

A new bridge will be built by Chattanooga, Tenn.

Bids will be received for the erection of a new bridge by the City of Atlanta, Ga.

The McCullough Iron Co., of Northeast, Md., is completing the work of replacing its building, which was destroyed by fire recently.

A bill appropriating $9,500 for the building of a new bridge in Buffalo, N.Y., has passed the New York legislature.

J. F. Cochran, of Aiken, S. C., will shortly build a foundry, the output to be used in the manufacture of farm implements.

A new bridge will be built by the Central Bridge Co., owners of the bridge which blew down in a storm recently, at Saginaw, Michigan.

The two stove foundries being erected for S. B. Tibbets, of Coldwater, Mich., are progressing rapidly. The main building is 60x180 feet, and the other 30x60 feet.

The Memphis Car & Foundry Co., Memphis, Tenn., has commenced the erection of an additional building, 50x180 feet, in which to build and repair cars and coaches.

The Newton Machine Tool Works, of Philadelphia, is being enlarged by the addition of a new shop 100x102 feet. New machinery will be installed, among which is an electric crane of 20 tons capacity.

The Philadelphia Roll & Machine Works, for which the machinery of the Bush Hill Iron Works was purchased recently, will build a machine shop 50x100 feet and a foundry 50x200 feet, both to be supplied with improved electric cranes and with the latest machine tools for turning out work economically.

Additions, Enlargements, Removals, Etc.:—

An addition is being built to the plant of the Pittsburg Reduction Co., at New Kensington, Pittsburg, a new iron building and a new train of rolls.

B. D. Northrop, of Washington, Pa., is erecting a new machine shop to replace the one recently destroyed by fire. The plant will be of brick, 60x50 feet in size, and an iron truss roof will be put on it by the Penn Bridge Co., of Beaver Falls.

The Hanover Machine Co., of Hanover, Pa., and the Fitz Machine Co. of Martinsburg, W. Va., have been consolidated, and it is reported that the Martinsburg plant will be removed to Hanover in the near future.

The Sterling Steel Co., of Pittsburg, has commenced the erection of a rolling mill in addition to its present plant at Demmler, Pa. It will be 60x112 feet in size, constructed of iron and steel, and will be built by the Shiffler Bridge Co., of Pittsburg.

Plans have been made for a large addition to the works of the Standard Sewing Machine Co., Cleveland. They provide for a building 43 feet wide, 208 feet long and four stories high. Beside it will be a brick stack 111 feet in height.

The building will be of the most approved mill construction and will cost $25,000.

The addition to the works of the Cleveland Machine Screw Co., Cleveland, has just been completed. It is of brick, three stories high and 43x203 feet. Another building 40x50 feet, and two stories high, has also been completed. The cost of the new buildings was $25,000.

Fires and Accidents:—

T. C. Gatti's machine shop, at Scranton, Miss., has been burned with a loss of $3,500.

The foundry of Foster & Kempke, at Menominee, Wis., has been burned, with a loss of $3,000.

The foundry of Theo. H. Calvin, Providence, R. I., has been destroyed by fire, entailing a loss of $12,000; insurance, $5,000.

The Vulcan Iron Works, at Cairo, Ill., were damaged $10,000 by fire; fully insured. The foundry suffered considerable loss.

W. E. Schaefer's foundry and machine shop at Ripon, Wis., has been destoyed by fire, with a loss of $10,000; insurance, $7,000.

General Industrial Notes:—

Hecla furnace, at Milesburg, Pa., will be put in operation in the near future.

Carolina furnace, of Greensboro, N. C., has just been blown in for the first time.

Red Jacket furnace, of the Shenango Valley Steel Co., New Castle, Pa., has been blown out for repairs.

The Wharton furnace, at Port Oram, N. J., has been put in operation, on neutral foundry and forge iron.

The Ensign Car Works, Huntington, W.Va., idle for months, will resume say in March, having orders for 750 cars.

At the Midland Steel Works, Muncie, Ind., the plant is now running 24 hours a day, most departments triple-turn.

The Weston furnace, at Manistique, Mich., went out of blast on the 15th inst. It will remain out for an indefinite period.

Valentine furnace, at Bellefonte, Pa, has been blown out, because of scarcity of ore and the necessity for making repairs.

The Whitely Co., Muncie, Ind., is still calling for molders, and will offer inducements to those who will locate in Muncie.

The Union Iron Works, at Spokane, Wash., destroyed by fire in last December, have been rebuilt, and are now in full operation.

A Trenton, N. J., dispatch says it is probable the Cooper & Hewitt Iron Works will close down for a time owing to lack of orders.

A proposition to reduce the wages of tin-housemen working by the Morewood process is being discussed by some tin plate manufacturers.

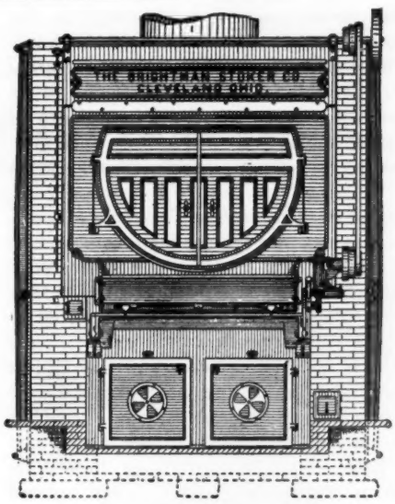
Spring Valley, Ill., is negotiating with the David Bradley Mfg. Co., of Chicago, with a view to getting its implement works for that city.

The Edgar Thomson plant of the Carnegie Steel Co. shut down Saturday, owing to a lack of orders for rails and billets. No date is fixed as yet for starting.

The pipe contract for the new water works at Beaver Falls, Pa., has been secured by the Anniston Pipe & Foundry Co., of Anniston, Ala., at $48,213.20.

The plant of the Western Iron & Steel Co., at Lake View, Wash., is ready for operations, and will be started up in the near future. This will be the second rolling mill on the coast.

The Youngstown (O.) Stamping Co. has reorganized under the name of the Youngstown Specialty Co., and will operate the plant. The new company was incorporated on Feb. 2



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IN THE WORLD.

Send for descriptive pamphlet.

THE BRIGHTMAN STOKER CO.,

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THURMAN FUEL OIL BURNER CO.

Gen'l Offices, 35 and 36 Cordova Bldg., INDIANAPOLIS, IND.

Acknowledged the best for Boilers, Forges, Furnaces, Ovens, etc. Write for Catalogues.

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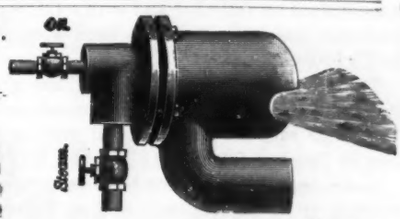


BURNER NO 4

J. POWER HELY, Chicago Manager,

1405 Monadnock Block, Chicago, Ill.

NOTE.—If you are using oil as fuel, and are not getting good results, we would be pleased to send you our burners on trial. The oil in our burners can be atomized by either steam or air.

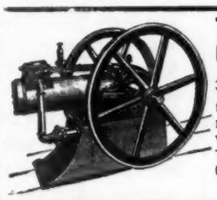
Fred F. Sharpless. Horace V. Winchell.

SHARPLESS & WINCHELL,

809 and 811 Wright Block, MINNEAPOLIS, MINN.

Analytical Chemists and Assayers.
Consulting Geologists and Mining Experts.

Mines examined. Advice given on treatment of ores and development of properties.
Intimate acquaintance with Lake Superior Mineral Regions.



The DAYTON Gas & Gasoline Engines

Are the latest and best Vertical and Horizontal Engines on the market. Simple and well constructed.

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Room 508. Cuyahoga Building. **Cleveland, Ohio.**

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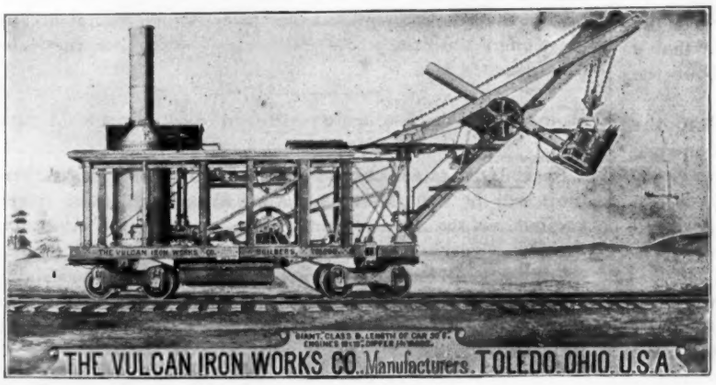
ENGINEERS.

Mining Reports and Estimates.

Spanish-American Business a Specialty.



STEAM SHOVELS!

VULCAN IRON WORKS CO.,

TOLEDO, O., U. S. A.

There is no Steam Shovel on the market so well adapted to handling Iron Ore as our "Giant." We guarantee 2,500 tons in ten hours.

Our "Giant" has the record on the Mesabi Range.

TRIED BY FIRE!

The only Cupola Block which gives absolute satisfaction. It is practically indestructible. We have a testimonial from the inventor of the *Colliau Cupola*, recommending it as "the best."

We have them in stock, made to fit any shell. The use of this block means a close, compact wall with few joints, and a great saving in both labor and material. Standard size fire brick from same clay.

"EVERYTHING FOR A FOUNDRY."

Write for One of our Hat Calendars.

F. B. STEVENS,

13 Atwater Street, West. DETROIT, MICH.

with a capital stock of $150,000 with Henry Tod, George E. McNabb, J. Craig Smith, F. T. Jeannot and W. C. Hine as incorporators.

The Cambridge, Mass., rolling mill and foundry have just been purchased by the Chelmsford Iron Foundry Co., of Chelmsford, Mass., and will be used for the manufacture of structural iron.

The Brazil Foundry & Machine Shops, Brazil, Ind., have resumed work on full time and with a full force of men. For the past two years this plant has been working on half-time with half a force.

The Duluth & Iron Range R. R. has given an order to the Pullman Co. of Chicago, for the construction of 300 ore cars. The same railroad company will give an order for 200 more cars in the near future.

Some negotiations have been in progress looking to the starting up of the Kimberly mill at Sharon, by George Baird of the Atlantic Iron Works, of New Castle. It is denied, however, that any arrangement has been made.

Mrs. Fannie M. DePauw, of New Albany, Ind., has filed a $50,000 damage suit against the New Albany Rail Mill Co. and the Union Trust Co. She alleges that her fourth interest in the rail mill company has been removed to Alexandria without her consent. In 1888 she leased the property to the company for a term of 10 years.

The Ironton (Minn.) Structural Steel Co. will build an open-hearth furnace and will make its own ingots. The original plan had been to buy from the Illinois Steel Co. The contract for the work has been let and the furnace will be completed in May. The number of gas producers at the Ironton plant will be increased from eight to 14.

In its Cincinnati industrial column, the Cincinnati *Commercial Gazette* says: "As an evidence that all manufacturers are preparing for a change, it is noticeable that all machine shops, foundries and repair works are rushed with work on machinery of every kind and description. Plants that are not now in operation are being repaired and improved."

The American Bolt & Iron Co. has just placed $25,000 worth of new machinery in its plant at Newport, Ky. The management says the company has enough orders already booked to keep the plant in active operation for several months with the full force working full time, and it is not improbable that a night force will be put on in the near future. About the usual force is working full time.

The E. P. Allis Co., of Milwaukee, has shipped to the Quincy Mining Co., of Hancock, Mich., a steel shaft of unusual size. The shaft with its three hubs, and two cranks weighs 60 tons and is 32 feet long. It will carry a steel hoisting drum that is 26 feet in diameter and has a 15-foot face. On each end of this great drum will be wound 14,000 feet of steel cable, 1½ inches in diameter, making 28,000 feet in all.

It developed at the annual meeting of the Witherow Co., at Pittsburg, recently, that the prospects of starting the New Castle plant are better than ever. Southern property of the company has been mortgaged to Col. Henry McCormick, of Harrisburg, and it is understood that the terms of the mortgage are such that the company can secure the necessary financial assistance at once, and that work will be commenced in March or April.

Hill, Clarke & Co. report great activity in the machinery line among bicycle manufacturers, and a very satisfactory business with them and some other special lines of trade. During December and January business was so good that they say they would not wish for any increase if they could do that amount steadily throughout the year. On the other hand, sales to the general run of machine shops and manufacturers have been very light. The tools for which there seems to be the greatest special demand at present from the customers of this firm, are the Flather lathes, Brainard milling machines and the several varieties of screw machines and turret machinery.

Car-building is reported by the *Railroad Gazette* as follows: The Ensign Mfg. Co. has an order for 700 fruit cars and 60 refrigerator cars from the Southern Pacific. The Pullman Co. got 300 and the Duluth Mfg. Co. 100 of the Duluth & Iron Range order of 400 cars. The Boston & Maine is expected to ask bids for 200 coal cars, 200 platform cars and 200 box cars. The Ohio Falls Car Co. is building 350 cars and the Elliott Car Co., Gadsden, Ala., 150 cars for the Southern Railway. The Pullman Car Co. has an order for 18 passenger coaches and 500 box cars from the Southern Pacific. The Union Car Works, Depew, N. Y., have orders for 500 cars for immediate delivery. The Hutchins Refrigerator Car Co. has ordered 200 standard refrigerator cars from the Wells & French Co. The Pennsylvania is preparing plans for 1,000 gondola cars. The New York Central & Hudson River Railroad is to give out contracts shortly for a large number of cars, probably 3,000. A good portion of the order will go to the Michigan Peninsular Car Co., and to the Union Car Works, Depew, N. Y.

Writing to the Pittsburg *Times* about the tin plate strike at Irondale, O., a workman says: "The major portion of the Morewood tin housemen are still in Irondale, but they have neither asked for nor accepted their situations, though they have several times been offered their work and scale wages paid in their department, but the tin housemen cannot accept these offers until the whole mill scale is signed, as they are Amalgamated men."

Home-Seekers Excursions South and Southeast via Pennsylvania Lines.

Special low rate excursion tickets with twenty day return limit will be sold March 5th, April 2d and 30th, from ticket stations on the Pennsylvania Lines to points in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia. For details, apply to nearest Pennsylvania Line Ticket Agent, or address F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburg, Pa.

The Reason Why

Economy of fuel, rapid melting, the production of a uniform grade and strength of iron is attained in the highest possible degree in the BLAKENEY CUPOLA FURNACE is comprehensively shown in the following cuts:

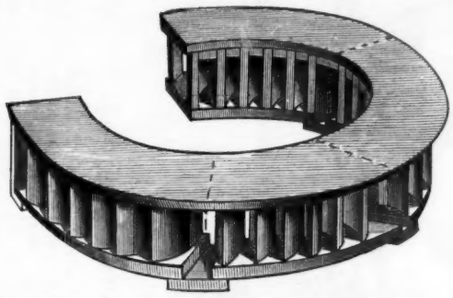


Fig. 1—The Combination of Sections of Tuyeres as placed in wall.

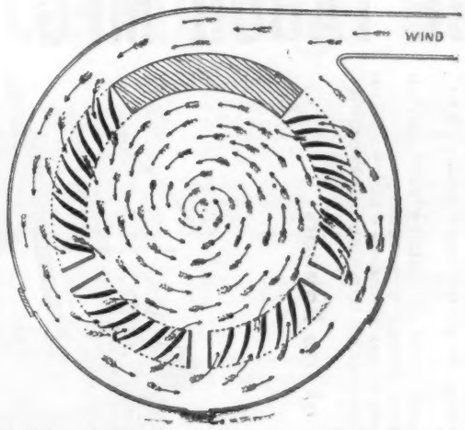


Fig. 2—Showing direction of Wind through the Curved Tuyeres.

ADOPTED BY U. S. NAVY DEPARTMENT.

Upon the manner of introducing the blast into the cupola depends the degree of combustion attained, consequently that form of tuyeres which will produce maximum results at a minimum cost is the great desideratum. We assert that this has been reached in the "Blakeney" tuyeres to a higher and more satisfactory degree than in any other device known, whether it be a combination of upper and lower tuyeres, a series of pipes, or the old-fashioned tuyeres; and we are certain that a little reflection on the part of any one familiar with cupola practice, will convince him that the projection of the blast through CURVED tuyeres will not only insure its penetration nearer to the center of the cupola, but its more even distribution to all parts of the cupola as well. It is upon this self-evident fact that we base our claim of the attainment of a combustion more nearly approaching perfection than by any other method. With better combustion it necessarily follows that there must be greater economy of fuel, faster melting less "hanging up," and the production of a more uniform grade and strength of iron. In a word, the "Blakeney" cupola is a continual source of profit and satisfaction in a foundry, and to any one desirous of improving their melting facilities, or who are in the market for a new cupola, we shall be pleased to send a descriptive catalogue. We are quoting "hard time" prices and solicit the privilege of submitting figures. To those whose cupolas are being run at a daily loss as compared with the results attained in the "Blakeney," we desire to state that we are prepared to apply these patent tuyeres and air-chamber to old cupolas at a nominal cost when the shell is in good condition.

A FEW "STRAWS" SHOWING THE WAY THE BLAKENEY CUPOLA "WIND" BLOWS.

LANCASTER, PA., August 29th, 1894.

The Springfield Cupola Co., Springfield, Ohio.

GENTLEMEN: In answer to yours of the 27th inst. regarding the working of the Blakeney Cupola purchased from you in January last, we are pleased to state that since getting the Cupola in operation we have been in receipt of a number of inquiries from interested parties, and our reply has invariably been to the effect that the Cupola is giving us entire satisfaction. We never handled one that melts iron so rapidly, and for rapid work and satisfactory results with the castings we can cheerfully recommend it. Yours truly, THE HUBLEY MANF'G CO., F. H. Steacy, Sec'y.

FULTON, ILL., Aug. 29, 1894.

The Springfield Cupola Co., Springfield, Ohio.

GENTLEMEN: Replying to your favor of recent date we would say that it affords us pleasure to state that the No. 4 Blakeney Cupola bought of you last November is giving us just as good satisfaction as the Blakeney we had in use for fifteen years in our works at Tiffin, O. During this time we were familiar with cupolas of other makes, but knew of none which could give the good results attained in yours, consequently when we removed our plant to this city, and were in the market for a new cupola, we immediately communicated with you for the purchase of a new Blakeney. You may refer to us whenever the opportunity offers. Yours truly, THE MISSISSIPPI VALLEY STOVE CO.

SEND FOR CATALOGUE No. 2.

THE SPRINGFIELD CUPOLA CO. Springfield, Ohio.

The Sturtevant Bridge Builders' Forge.

No. C1.

40 Sizes and Styles.

Portable and Stationary Forges.

PRICES REDUCED.

SEND FOR CATALOGUE No 77.

B. F. STURTEVANT COMPANY,

34 Oliver St., Boston, Mass.
91 Liberty St., New York, N. Y.
16 South Canal St., Chicago, Ill.
135 North Third St., Philadelphia, Pa.
75 Queen Victoria St., London, E. C., England.
21 W. Nile St., Glasgow, Scotland.
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THE TABOR MFG. CO.,

—MANUFACTURERS OF—
AUTOMATIC MOLDING MACHINES
For Sand Molds for Metal Castings.

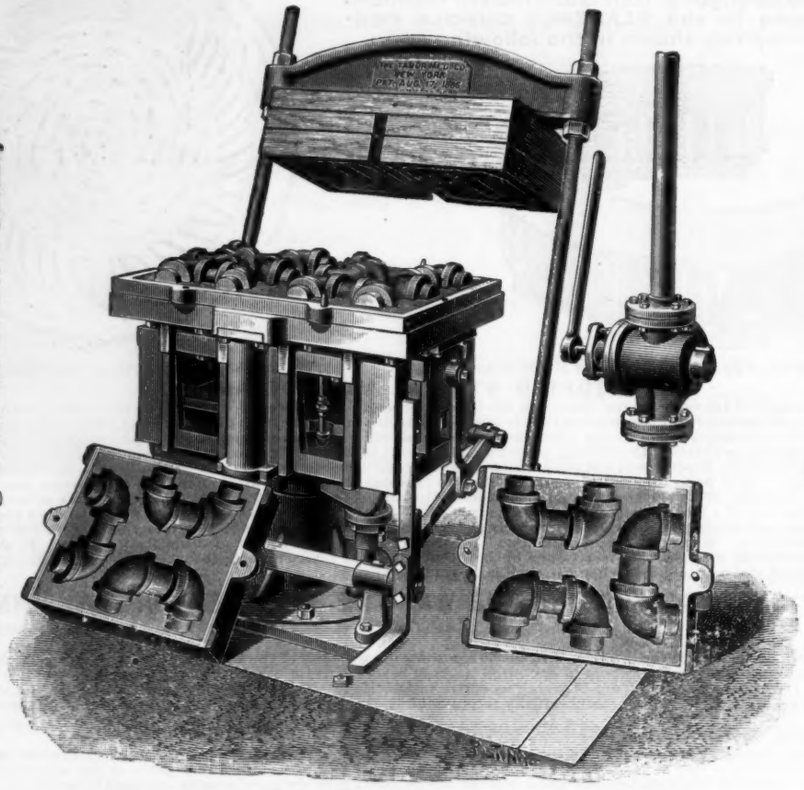
Note the advantages of the **only Power Molding Machine adapted to different sizes and shapes of flasks.**

Our 16″ Duplex will mold, working Duplex, both parts of flask 12″x16″ and all sizes below; this same machine, when working Single will mold flask 16″x20″ and all sizes under.

Our 20″ Duplex will mold, Duplex, both parts of flask 13″x18″ and all smaller sizes; working Single it will mold flask 18″x24″ and smaller sizes.

This feature allows a range of work, by one of our Machines, which would require a number of any other type. This is of the greatest importance to Foundries.

The Milling Machine of the Foundry.



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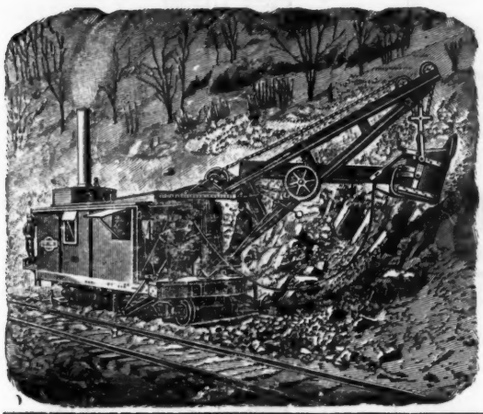

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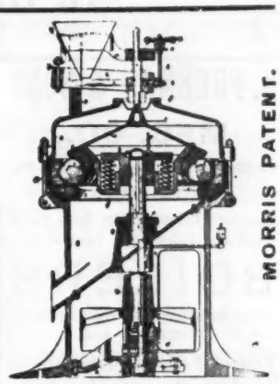

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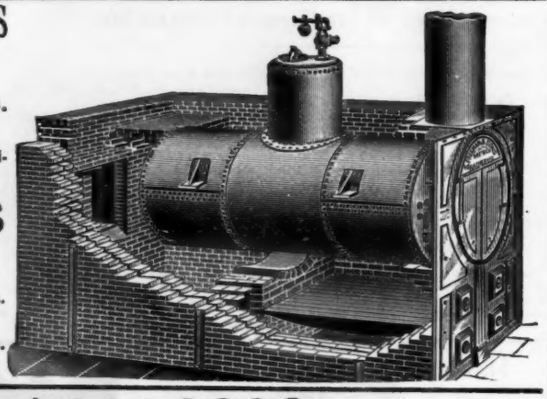

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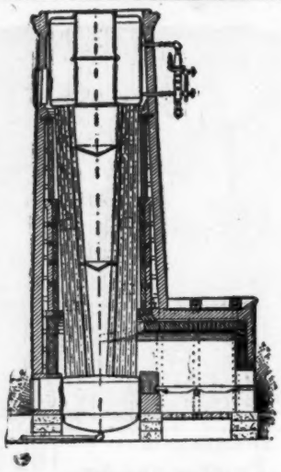

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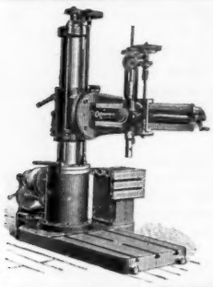

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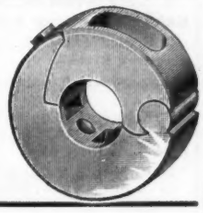

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Millett Core Oven Co., Brightwood, Mass.
Ohio Sand Co., Conneaut, O.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Cleveland Facing Mill Co., Cleveland, O.
Tabor Mfg. Co., New York City.
The Springfield Cupola Co., Springfield, O.
Chicago Chemical Solution Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.

Forgings—
Cleveland City Forge & Iron Co., Cleveland.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.
American Fire Brick & Clay Co., Mineral Point, Ohio.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

Fuel Oil Burners—
Thurman Fuel Oil Burner Co., Indianapolis, Ind

Galvanizers—
H. H. Hodell & Co., Cleveland.

Grindstones—
C. H. Besly & Co., Chicago, Ill.

Graphite Paint—
Jos. Dixon Crucible Co., Jersey City N. J.,

Heaters and Purifiers—
Stilwell & Bierce Manufacturing Co., Dayton, O.
Brightman Stoker Co., Cleveland, O
Warren, Webster & Co., Camden, N. J.

Heavy Hardware—
E. K. Morris & Co., Cincinnati, O.
C. H. Besly & Co., Chicago, Ill.

Hoisting and Conveying Machinery—
C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
W. A. Crook & Bro's Co., Newark, N. J.

Hoisting Blocks—
Moore Mfg. & Foundry Co., Milwaukee, Wis.

Hoisting Engines—
The John F. Byers Machine Co., Ravenna, O.
C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
Vulcan Iron Works Co., Toledo, O.
W. A. Crook & Bro's Co., Newark, N. J.

Hot Water Heaters—
United States Heater Co., Detroit, Mich.

House Heaters—
United States Heater Co., Detroit, Mich.

Injectors—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

Iron Nails and Steel—
Weber & Co., Cincinnati, O.
G. B. Schulte Sons Co., Cincinnati, O.
Geo. H. Sibell & Co., Chicago, Ill.
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.

Iron and Steel Roofing—
Sykes Iron & Steel Roofing Co., Niles, O.
Berger Mfg. Co., Canton, O.

Iron Ore, Bar and Pig Iron—
Oglebay, Norton & Co., Cleveland.
Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Geo. H. Sibell & Co., Chicago, Ill.
Forster, Hawes & Co., Chicago, Ill.

Iron Working Tools—
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Cleveland Twist Drill Co., Cleveland, O.
Prentiss Tool & Supply Co., Chicago, Ill.
Toledo Machine & Tool Co., Toledo, O.
W. F. & John Barnes Co., Rockford, Ill.
H. Bickford, Lakeport, N. H
Hill, Clarke & Co., Chicago, Ill.
Cincinnati Milling Machine Co., Cincinnati, O
New York Machinery Depot, 178 Broadway, New York City.
Fox Machine Co., Grand Rapids, Mich.
Lodge & Shipley Machine Tool Co., Cincinnati.
Manufacturers' Tool Supply Co., Chicago.
W. H. Holmes & Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Link Belting—
The Jeffrey Mfg. Co., Columbus, O.

Lathes—
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W. F. & John Barnes Co., Rockford, Ill.
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Fox Machine Co., Grand Rapids, Mich.
New York Machinery Depot, 178 Broadway, New York City.
Ed. Wertheim, Chicago.
Manufacturers' Tool Supply Co., Chicago.
Gouverneur Machine Co., Gouverneur, N. Y.
C. H. Besly & Co., Chicago, Ill.

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Illinois Screw Co., Chicago, Ill.
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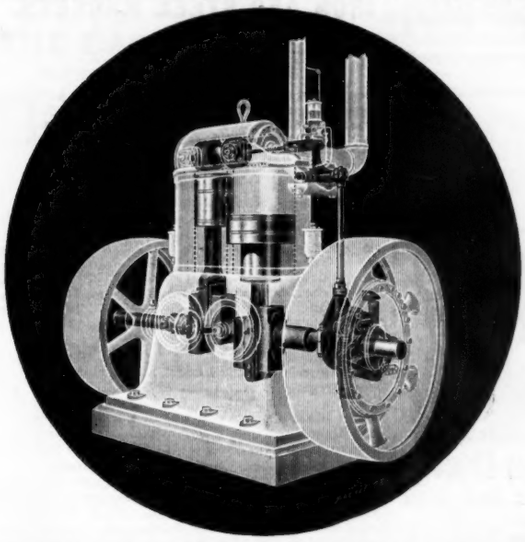
John Fraser, Chicago, Ill.

Metal Saws—
Q. & C. Co., Chicago, Ill.

Mining Engineers—
Richard A. Parker, Marquette, Mich.



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STANDARD, 5 to 250 H. P. A High-Class Automatic Engine.

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Vulcan Iron Works Co., Toledo, O.
C. H. Besly & Co., Chicago, Ill.
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Smokeless Furnaces—
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Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
Lodge & Shipley Machine Tool Co., Cincinnati.

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Gouverneur Machine Co., Gouverneur, N. Y.

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Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

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Ed. Wertheim, Chicago.
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Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
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Steam Specialties—
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Wm. Jessop & Sons, Ltd., New York, N. Y.

Steel Castings—
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Cleveland Rolling Mill Co., Cleveland.
Bethlehem Iron Co., South Bethlehem, Pa.

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Brightman Stoker Co., Cleveland, O.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.

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S. Freeman & Sons Mfg. Co., Racine, Wis.
Enterprise Boiler Co., Youngstown, O.

Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.

Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.
C. H. Besly & Co., Chicago, Ill.

Twist Drills—
Cleveland Twist Drill Co., Cleveland.
Manufacturers' Tool Supply Co., Chicago.
C. H. Besly & Co., Chicago, Ill.

Valves—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Ventilating Fans—
Brightman Stoker Co., Cleveland, O.

Washers—
Milton Mfg. Co., Milton, Pa.

Wire Fences—
McCallip Fence Co., Columbus, O.

Wire Goods—
McCallip Fence Co., Columbus, O.

Wire Rope—
W. A. Crook & Bro's Co., Newark, N. J.
C. W. Hunt Co., New York City.
George Cradock & Co., Chicago, Ill.

Wire Machinery—
John Adt & Son, New Haven, Conn.
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CHICAGO HEIGHTS

The Industrial Centre of Chicago

offers **Free Factory Sites** and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition.

Chicago Heights Land Association

M. H. KILGALLEN, Gen'l Mgr. CHICAGO

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CHICAGO HEIGHTS

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311 WALNUT ST., PHILADELPHIA

Manufacturer and Patentee

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Hot Blast Pyrometer.—The only stationary Pyrometer now in use durable over 700 degrees.

Mercury Revolution Indicator.—Centennial Exhibition Medal. Accurate for all time.

Annealing Oven Pyrometer—to 3,000 degrees—of 1893.

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The name of the Chicago, Milwaukee & St. Paul Railway has long been indentified with practical measures for the general upbuilding of its territory and the promotion of its commerce, hence manufacturers have an assurance that they will find themselves at home on the company's lines.

The Chicago, Milwaukee & St. Paul Railway Company owns and operates 6,154 miles (9,900 kilometers) of railway, exclusive of second track, connecting track or sidings. The eight States traversed by the lines of the company, Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota, and North Dakota, possess, in addition to the advantages of raw material and proximity to markets, that which is the prime factor in the industrial success of a territory—a people who form one live and thriving community of business men, in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

Mines of coal, iron, copper, lead and zinc, forests of soft and hard wood, quarries, clays of all kinds, tan-bark, flax and other raw materials exist in its territory in addition to the vast agricultural resources.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway, makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable.

Address **LUIS JACKSON,**

Industrial Commissioner, C., M. & St. P. R'y.,

425 Old Colony Bldg., CHICAGO, ILL.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	3.00@ 3.35
No. 1 Bessemer hematite	2.75@ 3.00
Hematites No. 1 non-Bessemer	2.00@ 2.50
No 1. Specular, non-Bessemer	2.35@ 3.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$10 00@$10 25
No. 1 Strong Foundry	11 00@ 11 25
No. 2 Strong Foundry	10 00@ 10 25
No. 1 Gray Forge, red short	9 10@ 9 25
No. 2 Gray Forge, neutral	9 00@ 00 00
No. 1 American Scotch	11 25@ 00 00
No. 2 American Scotch	10.25@ 00 00
Lake Superior Charcoal	12 50@ 13 00
PITTSBURG:	
No. 1 Foundry	$11 25@$11 75
No. 2 Foundry	10 25@ 10 75
Gray Forge	9 50@ 9 75
White and Mottled	9 00@ 9 25
Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	10 65@ 00 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 00@$13 50
Local Coke Foundry No. 1	10 25@ 10 50
Local Coke Foundry No. 2	9 75@ 10 00
Local Coke Foundry No. 3	9 40@ 9 65
Local Scotch Foundry No. 1	10 25@ 10 50
Local Scotch Foundry No. 2	9 75@ 10 00
Local Scotch Foundry No. 3	9 50@ 9 75
Southern Coke No. 1	11 00@ 11 25
Southern Coke No. 2	10 00@ 10 25
Southern Coke No. 3	9 50@ 9 75
Southern No. 1 Soft	10 00@ 10 25
Southern No. 2 Soft	9 75@ 10 00
Southern Silveries No. 1	11 50@ 11 75
Southern Silveries No. 2	11 25@ 11 50
Jackson Co. Silveries	15 50@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	12 50@ 13 00
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	11 00@ 11 50
Coke Bessemer	11 00@ 11 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 9 75@$10 50
Southern Coke No. 2 and No. 1 Soft	9 25@ 9 50
Hanging Rock Coke, No 1	12 00@ 12 00
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 50
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	14 50@ 15 00
Southern Coke, Gray Forge	8 50@ 8 00
" " Mottled	8 25@ 8 75
Standard Alabama Car Wheel	15 75@ 16 50
Tennessee " "	15 50@ 16 75
Lake Superior " "	14 00@ 14 00
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 00
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 50
Ohio Strong Softener No. 1	11 10
Jackson Co. Silvery No. 1	15 50
Lake Superior Charcoal	13 75
Southern Soft No. 1	11 00
Hanging Rock Charcoal	18 50
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$10 25@$10 50
Southern Coke No. 2	9 75@ 10 00
Southern Coke No. 3	9 25@ 9 50
Southern Gray Forge	9 00@ 9 25
Southern Charcoal No. 1	14 00@ 14 50
Missouri Charcoal No. 1	12 50@ 13 00
Ohio Softeners	14 00@ 14 50
Lake Superior Car Wheel	15 50@ 16 00
Southern Car Wheel	16 00@ 16 50
Connellsville Coke, St. Louis	4 40

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$12 50
Old steel rails	10 00
	NET TONS
No. 1 R. R. wrought scrap	$ 9 00
No. 1 wrought scrap	8 00
No. 1 Machine cast scrap	8 00
Iron axles	14 50
Axle turnings	7 50
Wrought turnings (free from cast)	6 50
Cast borings	5 50
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 00
Tank iron	7 50
Hoop and band iron	6 00
Sheet iron	5 50
Wrought drillings	6 50
Malleable iron	8 00

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.25c@1.35c
Angles	1.20c@1.25c
Tees	1.35c@1.45c
Universal Plates	1.20c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 30
1¼ to 6 by ⅜ to 1 inch	1 35
1¾ to 6 by 1¾ to 2 inch	1 50
1¼ & 1¾ by ⅜ to ¾ inch	1 35
1 & 1¼ by ⅜ to ¾ inch	1 40
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 50

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Geo. H. Bowler, Sec'y and Treas.

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AUTOMATIC MACHINERY.
Power Presses, Dies, Drop Hammers, Punches and Shears, Wire Straighteners and Cutters, Wire Forming Machines
SEND FOR CATALOGUE.

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OF ALL KINDS FOR
MILLING MINING AND
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PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

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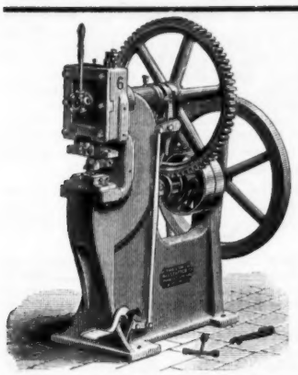

THE
LONG & ALLSTATTER CO.
HAMILTON, OHIO, U. S. A.

Manufacturers of Belt, Steam and Electrically driven

POWER PUNCHES AND SHEARS,

for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc.
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MANUFACTURERS OF HIGH GRADE FIRE BRICKS.
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.

DIXON'S PERFECT LUBRICATING GRAPHITE.
The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease
NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.
An Interesting and Instructive Pamphlet will be sent Free of Charge.
JOS. DIXON CRUCIBLE CO. Jersey City, N. J.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,
CLEVELAND, OHIO.

ORDER DIRECT FROM THE
Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Subscribe for The Iron Trade Review, $3 per year.

Round and Square.

1 to 1⅞ inch	1 30
2 to 2⅜ inch	1 40
2¾ to 3¼ inch	1 55
3⅜ to 4 inch	1 80
4¼ to 4½ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅞ to 1¼ inch	1 50
⅝ to ¾ inch	1 50
½	1 70
⅜	1 90

Half Oval and Half Round.

1½ to 3 inch	1 85
⅞ to 1¼ inch	1 65
⅝ to ¾ inch	1 90
½	2 05
⅜	3 15

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 40
1 to 1⅜ by ¼ and 5-16 inch	1 45
¾ to ⅞ by ¼ and 5-16 inch	1 55
½ to ⅝ by ¼ and 5-16 inch	1 80

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1½ to 1⅜, No. 13, 14 and 15	1 90
1½ to 1⅜, No. 16, 17 and 18	1 95
1½ to 1⅜, No 19 and 20	2 00
1½ to 1⅜, No. 21	2 10
1½ to 1⅜, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16, 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16, No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
1-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅝, No. 13, 4 and 15	2 60
⅝, No. 16, 17 and 18	2 70
⅝, No. 19 and 20	2 80
⅝, No. 21	2 90
⅝, No. 22	3 00
⅝, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16, No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
⅜, No. 13, 14 and 15	3 50
⅜, No. 16, 17 and 18	3 60
⅜, No. 19 and 20	3 70
⅜, No. 21	4 00
⅜, No. 22	4 10
⅜, No. 23	4 25

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 60
1½ to 6 by Nos. 11 and 12	1 65
1 to 1⅜ by ⅛ to 3-16 inch	1 65
1 to 1⅜ by Nos. 11 and 12	1 70
⅞ and 13-16 by ⅛ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95
No. 15-17	2 05
No. 18	2 20
No. 20	2 30
No. 22-24	2 40
No. 25.26	2 50
No. 27	2 60

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 60
Shell	1 85
Flange	2 10
Marine Flange	2 35
Fire Box	3 35
Above includes plates 90 inches wide.	
90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1¼c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08□
9-16 to ½ in. "	08½

HOISTING MACHINERY for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling, and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting, Mining Purposes and Suspensoin Cable Ways.

Send for Illustrated Catalogue giving full description, etc.

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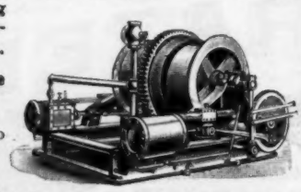

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For Hoisting and Conveying Purposes.

SECTIONAL TRACK, INDUSTRIAL AND CABLE RAILWAYS. 2
BARROWS, COAL BUCKETS, WIRE ROPE, TIP CARS, ETC.

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"LUNKENHEIMER'S" is the best Globe or Angle Valve on the market. If leaky, can be reground without disconnecting from pipes, making same as good as new.

Once Used, Always Used.

Also heavy pattern for marine purposes. In long tried use on Steamboats, Locomotives, Refineries, Rolling Mills, U. S. Cruisers. None genuine without our name, which is cast in the shell. Specify and insist upon getting "Lunkenheimer's." New Catalogue of Superior Steam Specialties will interest you. Gratis upon request.

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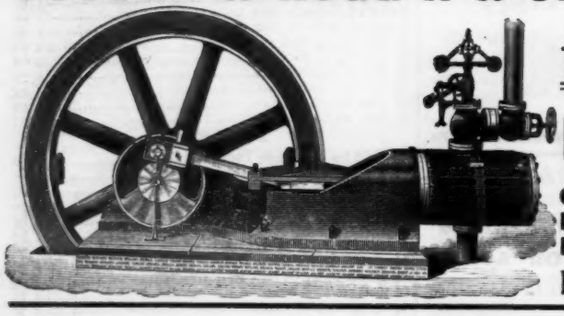

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OAK HILL FIRE BRICK AND COAL CO. Manufacturers

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7-16 to ⅜ and 2¾ to 3 in.	.09
3⅛ to 4 in.	.09½
⅞ to 11-16 and 4½	.10
⅛ to 6 in.	.10½
¼ to 9-32 and 6⅛ to 7 in.	.11
16 in	.13

Flats.

3	cts. lbs.
2 to 9-16 in. wide by 2 to ⅜ thick	.8

Bessemer and O. H. Steel.

Machinery	base price,	1 80
Tire	"	1 85
Spring	"	2 20
Sleigh Shoe	"	2 20
Toe Calk	"	2 05
Cutter Shoes, tapered and bent	"	2 45

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 40

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths' { Hill's	dis 40
Blacksmiths' { Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70

THE LANE & BODLEY CO.,

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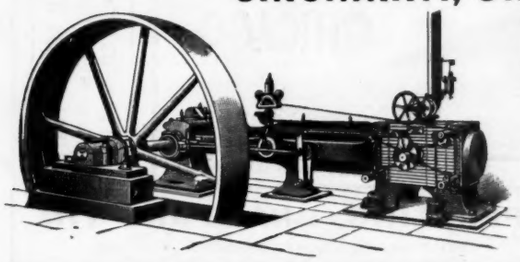

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Simple and Compound.

Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

Have You Any Sand?

On your castings that you want removed?

If So,

The ACME CHEMICAL SOLUTION. TRADE MARK. FOR CLEANING METAL CASTINGS & THE SURFACES OF METALS. C.C.S.MNF'G.CO

Will clean them better than any other method.

Try It.

Chicago Chemical Solution Mfg. Co.

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Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†2:45 pm	*12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Saturdays the 8:00 pm train will leave at 11:20 pm.

Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster		*6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	†11:00 A M

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THE UPSON NUT CO., Manufacturers of Nuts, Washers, Carriage, Machine, Plow and Elevator Bolts, Coach Screws, etc.

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PETER GERLACH & CO.,

MAKERS OF

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Office and Warerooms, 28 Columbus St.
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Elastic Rotary-Blow Riveting Machine.

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Builders of Machinery for Hardware Manufacture.

AUTOMATIC

Wire Straightening and Cutting Machines,

BUTT MILLING MACHINERY,

Butt Drilling Machinery,

Riveting Machines

Foot Presses,

Gurne Cutters, Etc.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¾	3½
Hexagon	15¾	11¾	8½	6	5¾	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ℔ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ℔ keg card rate	
Car lots	$1.10
Less than car lots	$1.25

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ℔ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	℔ lb 9@10
Russia " "	℔ lb 14
Italian " "	℔ lb 13@19
Plumbago Piston	℔ lb 40
Peerless	℔ lb 60
Morrison's "	℔ lb 45
Square Flax "	℔ lb 50
Sheet Rubber	℔ lb 12&24
Excelsior Rubber	℔ lb 48
Rainbow { Full Rolls	45c ℔ lb
Rainbow { Less than Full Rolls	50c ℔ lb
Eclipse Gasket	℔ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Rivets.

Iron, Thousand, list November 17, 1887	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17, 1887	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 57½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ℔ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 55
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

Perforated Filter Press Plates.

THE HARRINGTON & KING PERFORATING CO. CHICAGO.

BRONZE SCREEN PLATES To withstand action of ACIDULATED WATERS.

PERFORATORS OF STEEL, IRON, COPPER, ZINC, BRASS AND TIN.

For use in GRAIN CLEANING AND MINING MACHINERY, WOOLEN, COTTON, PAPER AND PULP MILLS, RICE, FLOUR AND COTTON SEED OIL MILLS, SUGAR AND MALT HOUSES. DISTILLERIES, FILTER PRESSES. STONE, COAL, AND ORE SCREENS, BRICK AND TILE WORKS, FILTERS, SPARK ARRESTERS, GAS AND WATER WORKS, OIL, GAS AND VAPOR STOVES, COFFEE MACHINERY, ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

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WHEELER'S PATENT VERTICAL WATER TUBE BOILER.

SAFE, ECONOMICAL, DURABLE.

The best boiler made for the use of gaseous fuel at blast furnaces, puddling and heating furnaces.

Address for particulars

WHEELER BOILER CO., Sharon, Pa.

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.... FOR ....

FURNACES AND MINES, FACTORIES, ETC.

Triplex Power and Electric Pumps, Rotary Pumps, Artesian Well Steam Pumps, Hydraulic Boiler Test Pumps, etc.

MANUFACTURED BY

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HENION & HUBBELL, General Western Agents, CHICAGO.

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WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

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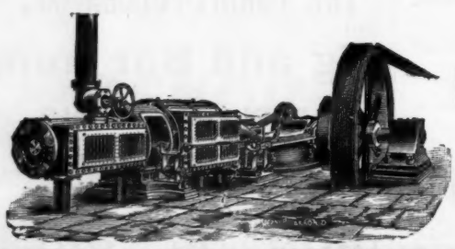
SINGLE, COMPOUND & CONDENSING

Blowing Engines.

Hydraulic Cranes and Accumulators.

Heavy Special Machinery.



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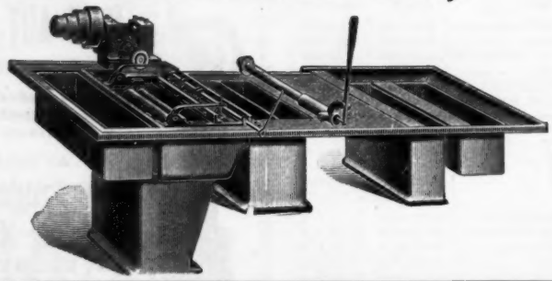

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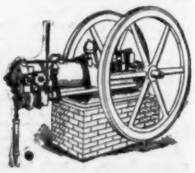

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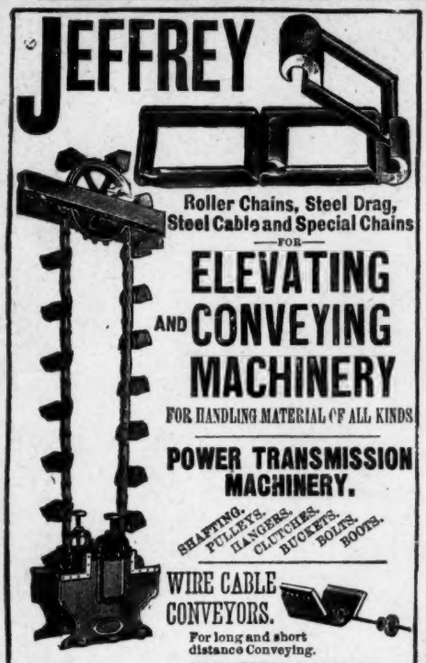

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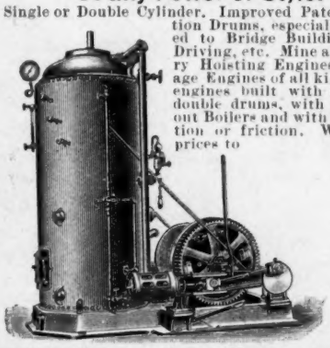

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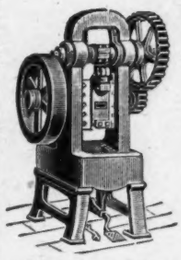

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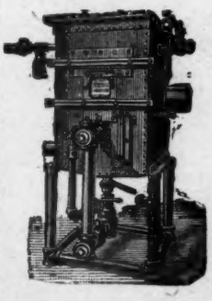

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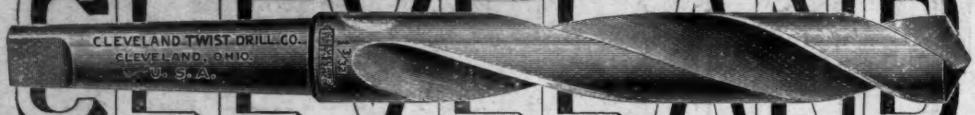

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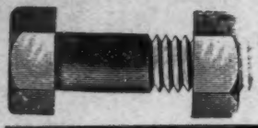

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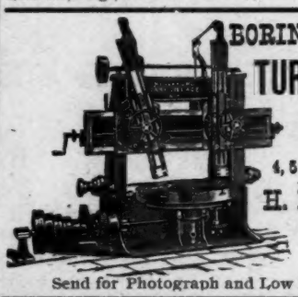

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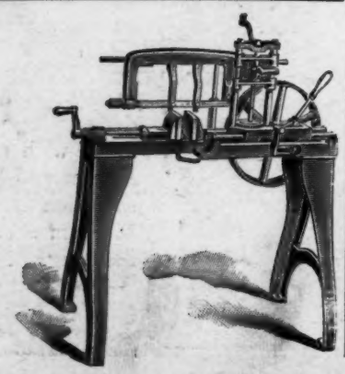

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